

Jan. 9, 1940.

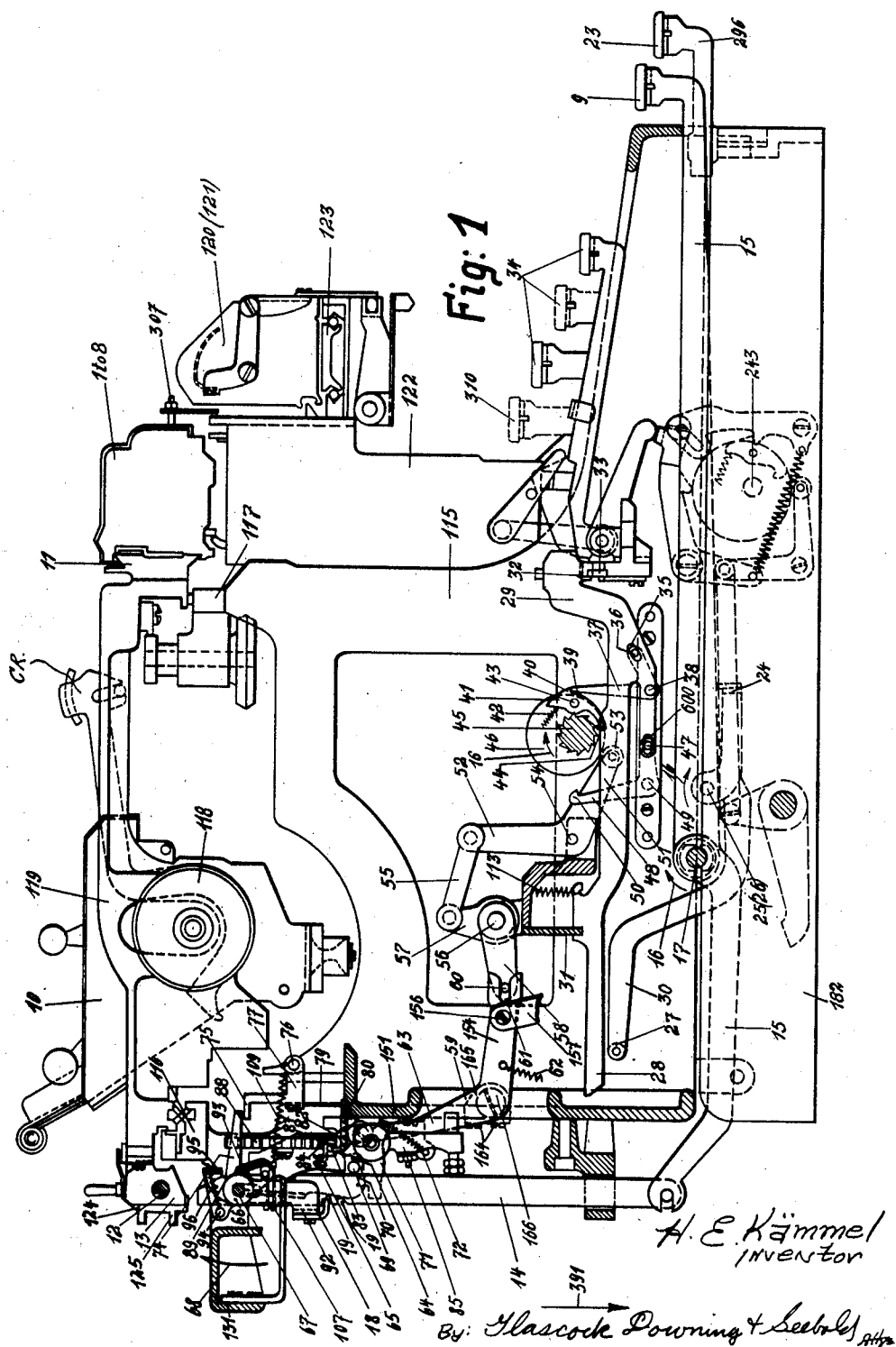
H. E. KÄMMEL

2,186,642

TYPEWRITING-CALCULATING MACHINE OR THE LIKE WITH TOTAL-TAKING MECHANISM

Filed Dec. 10, 1935

20 Sheets-Sheet 1



Jan. 9, 1940.

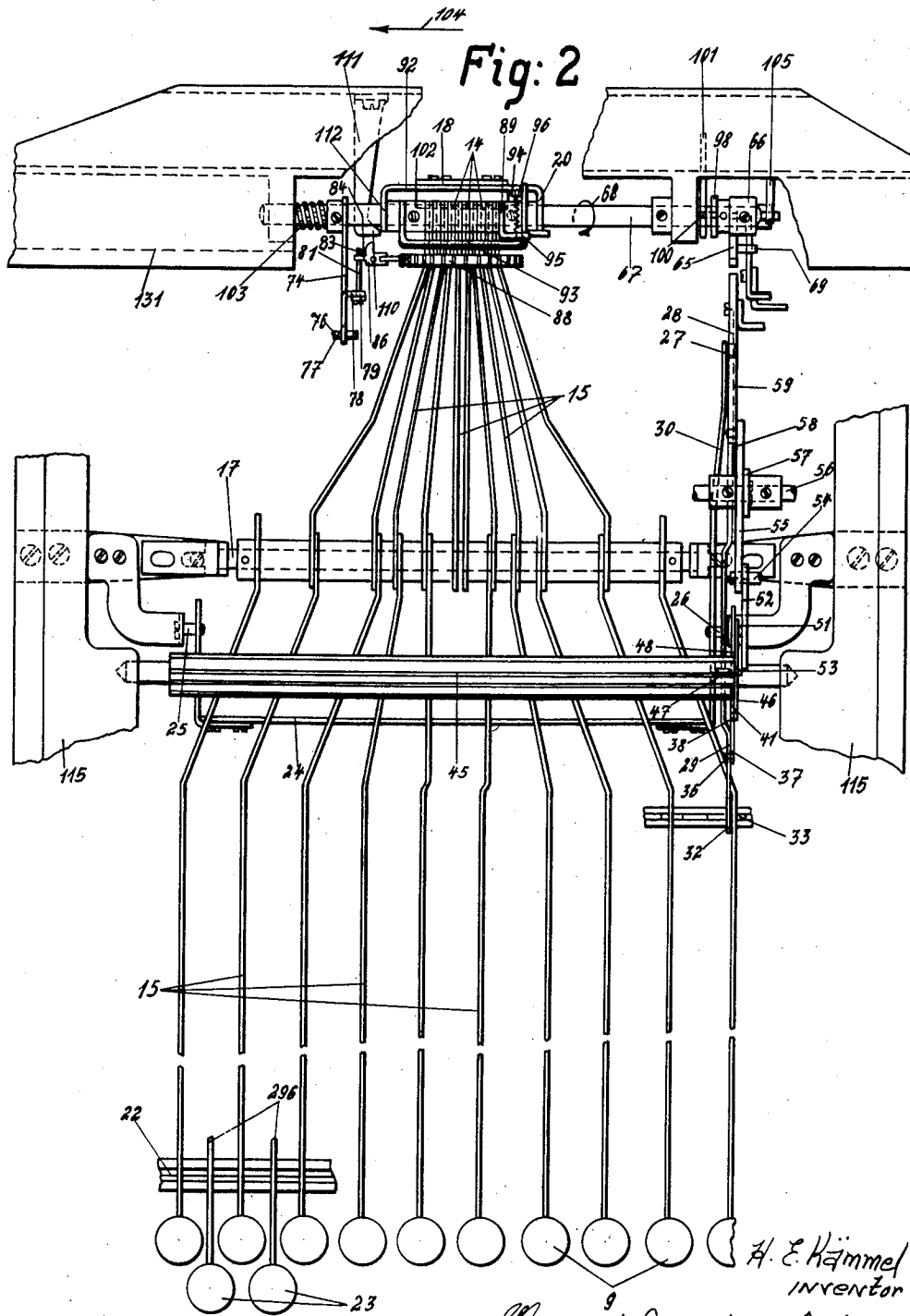
H. E. KÄMMEL

2,186,642

TYPEWRITING-CALCULATING MACHINE OR THE LIKE WITH TOTAL-TAKING MECHANISM

Filed Dec. 10, 1935

20 Sheets-Sheet 2



By: *Gascope Downing & Seibold* atty.

Jan. 9, 1940.

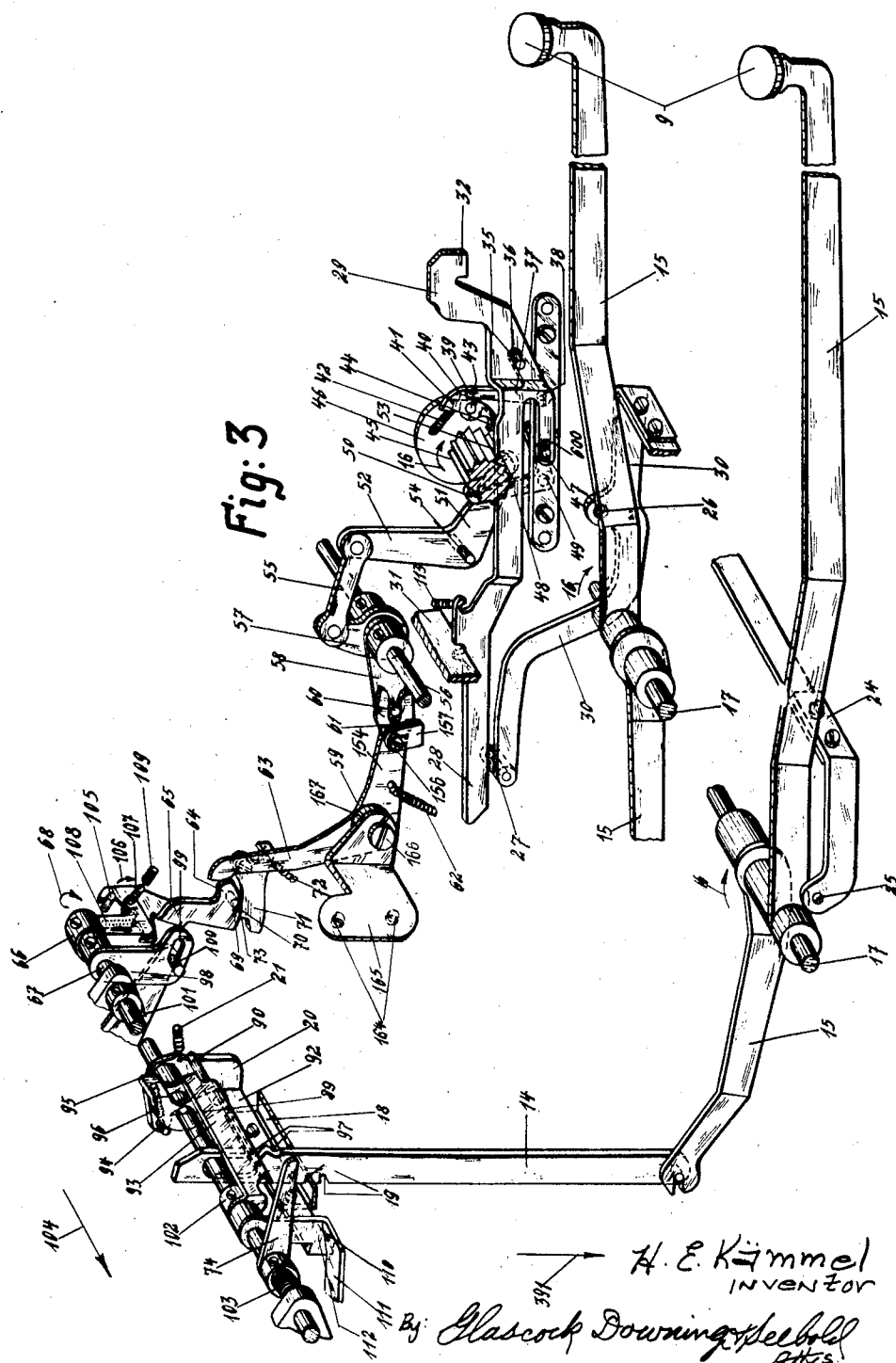
H. E. KÄMMEL

2,186,642

TYPEWRITING-CALCULATING MACHINE OR THE LIKE WITH TOTAL-TAKING MECHANISM

Filed Dec. 10, 1935

20 Sheets-Sheet 3



Jan. 9, 1940.

H. E. KÄMMEL

2,186,642

TYPEWRITING-CALCULATING MACHINE OR THE LIKE WITH TOTAL-TAKING MECHANISM

Filed Dec. 10, 1935

20 Sheets-Sheet 4

Fig: 6

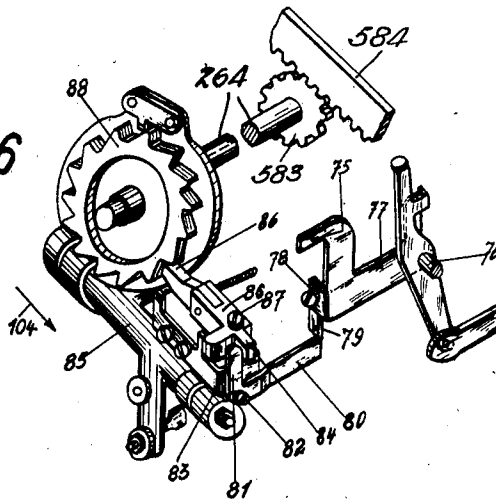


Fig: 4

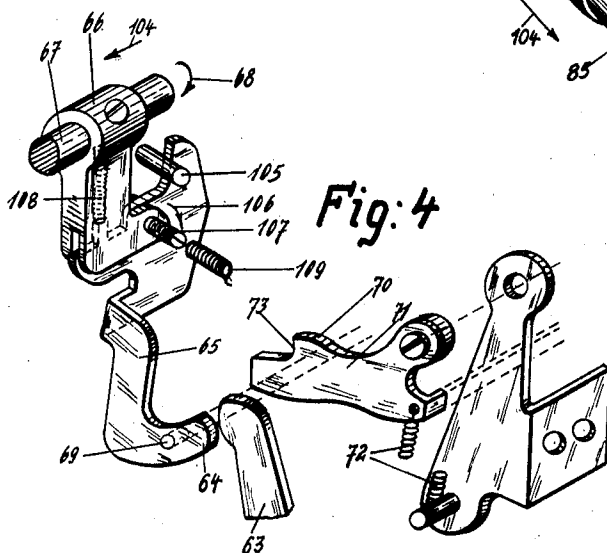
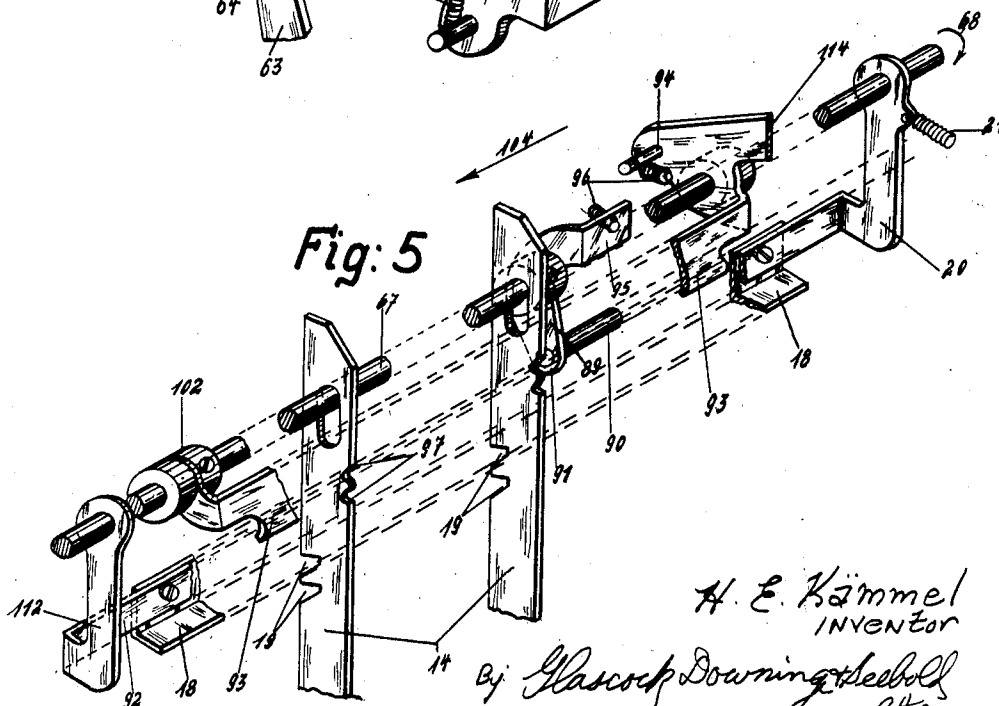


Fig: 5



H. E. Kämmel
INVENTOR

By Glascock Downing & Seebold
Attys.

Jan. 9, 1940.

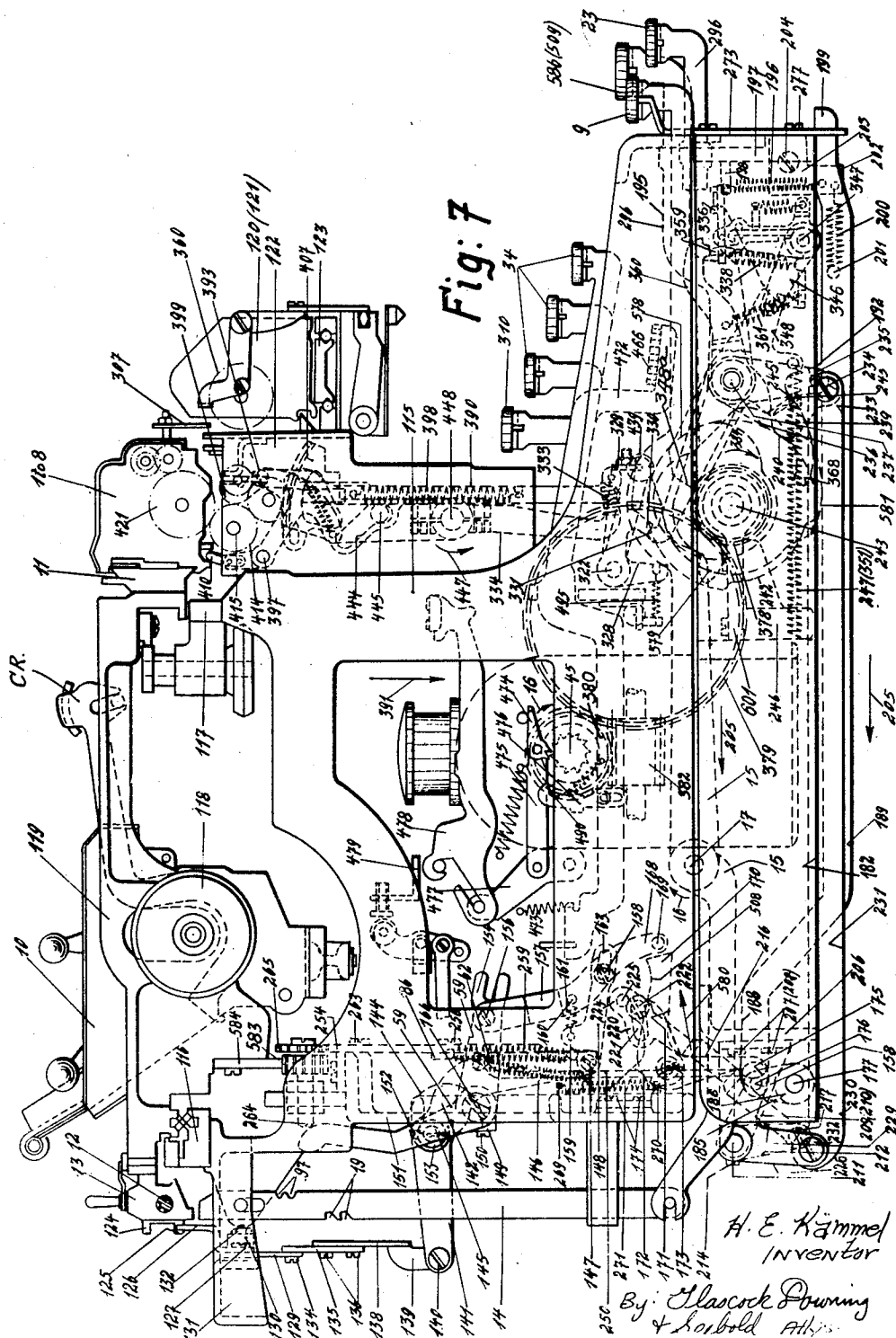
H. E. KÄMMEL

2,186,642

TYPEWRITING-CALCULATING MACHINE OR THE LIKE WITH TOTAL-TAKING MECHANISM

Filed Dec. 10, 1935

20 Sheets-Sheet 5



Jan. 9, 1940.

H. E. KÄMMEL

2,186,642

TYPEWRITING-CALCULATING MACHINE OR THE LIKE WITH TOTAL-TAKING MECHANISM

Filed Dec. 10, 1935

20 Sheets-Sheet 6

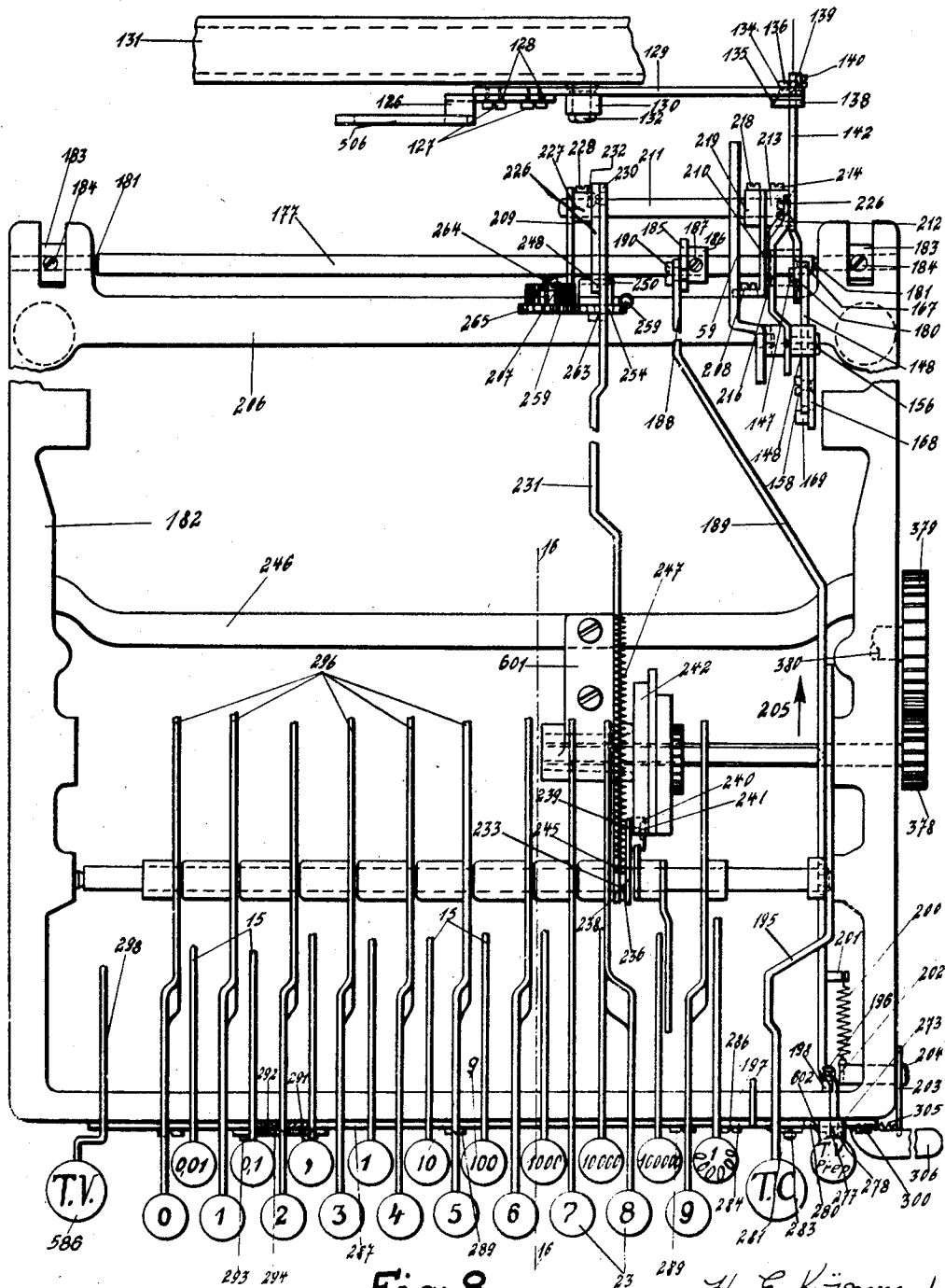


Fig: 8

A. E. Kimmel
inventor

By: Glascok Downing Deed
Att'y.

Jan. 9, 1940.

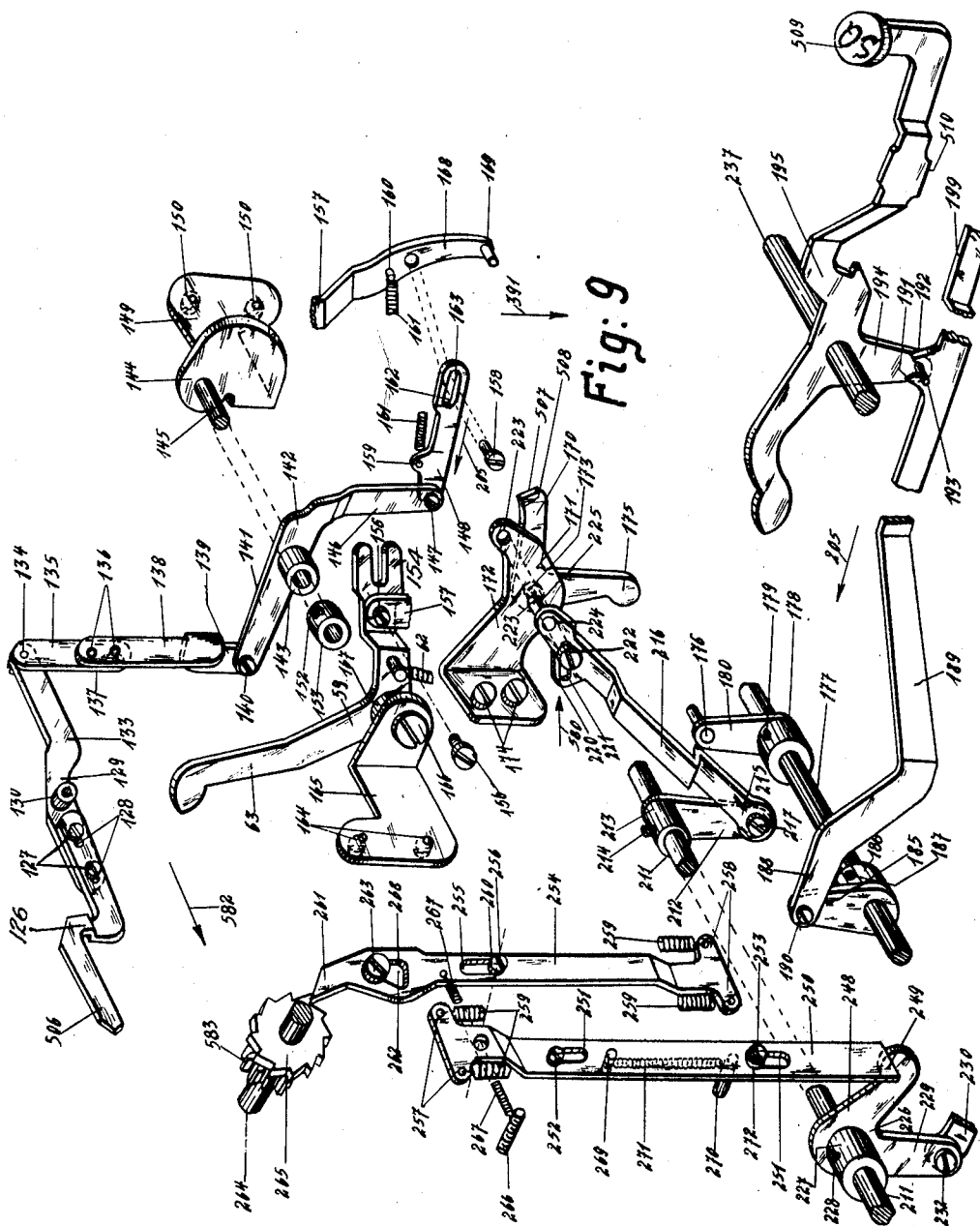
H. E. KÄMMEL

2,186,642

TYPEWRITING-CALCULATING MACHINE OR THE LIKE WITH TOTAL-TAKING MECHANISM

Filed Dec. 10, 1935

20 Sheets-Sheet 7



H. E. Kämmel
Inventor

By: Glascock Downings & Seebold
Attys.

Jan. 9, 1940.

H. E. KÄMMEL

2,186,642

TYPEWRITING-CALCULATING MACHINE OR THE LIKE WITH TOTAL-TAKING MECHANISM

Filed Dec. 10, 1935

20 Sheets-Sheet 8

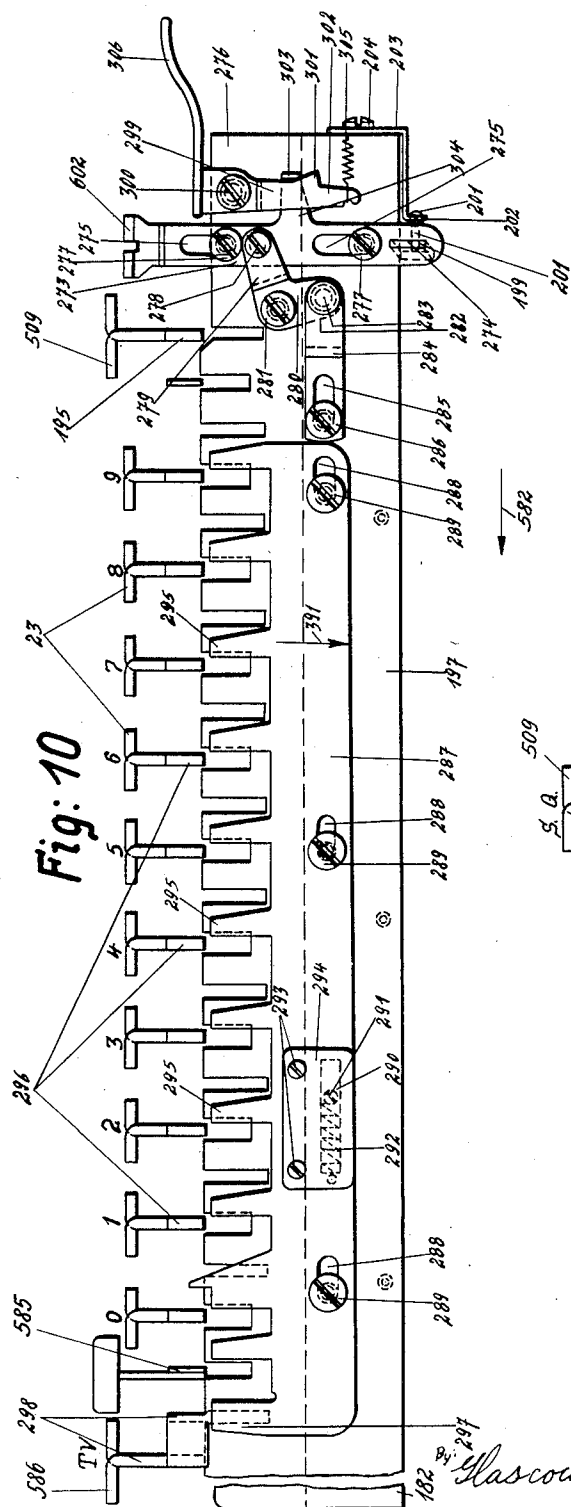


Fig. 10

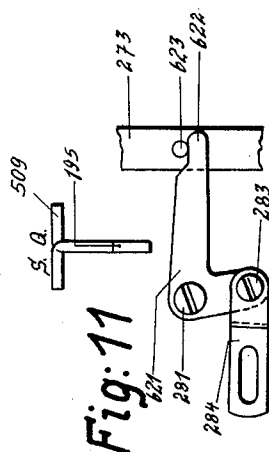


Fig. 11

H. E. Kämmel
INVENTOR

Glascok Downing Seebold
ATTY.

Jan. 9, 1940.

H. E. KÄMMEL

2,186,642

TYPEWRITING-CALCULATING MACHINE OR THE LIKE WITH TOTAL-TAKING MECHANISM

Filed Dec. 10, 1935

20 Sheets-Sheet 9

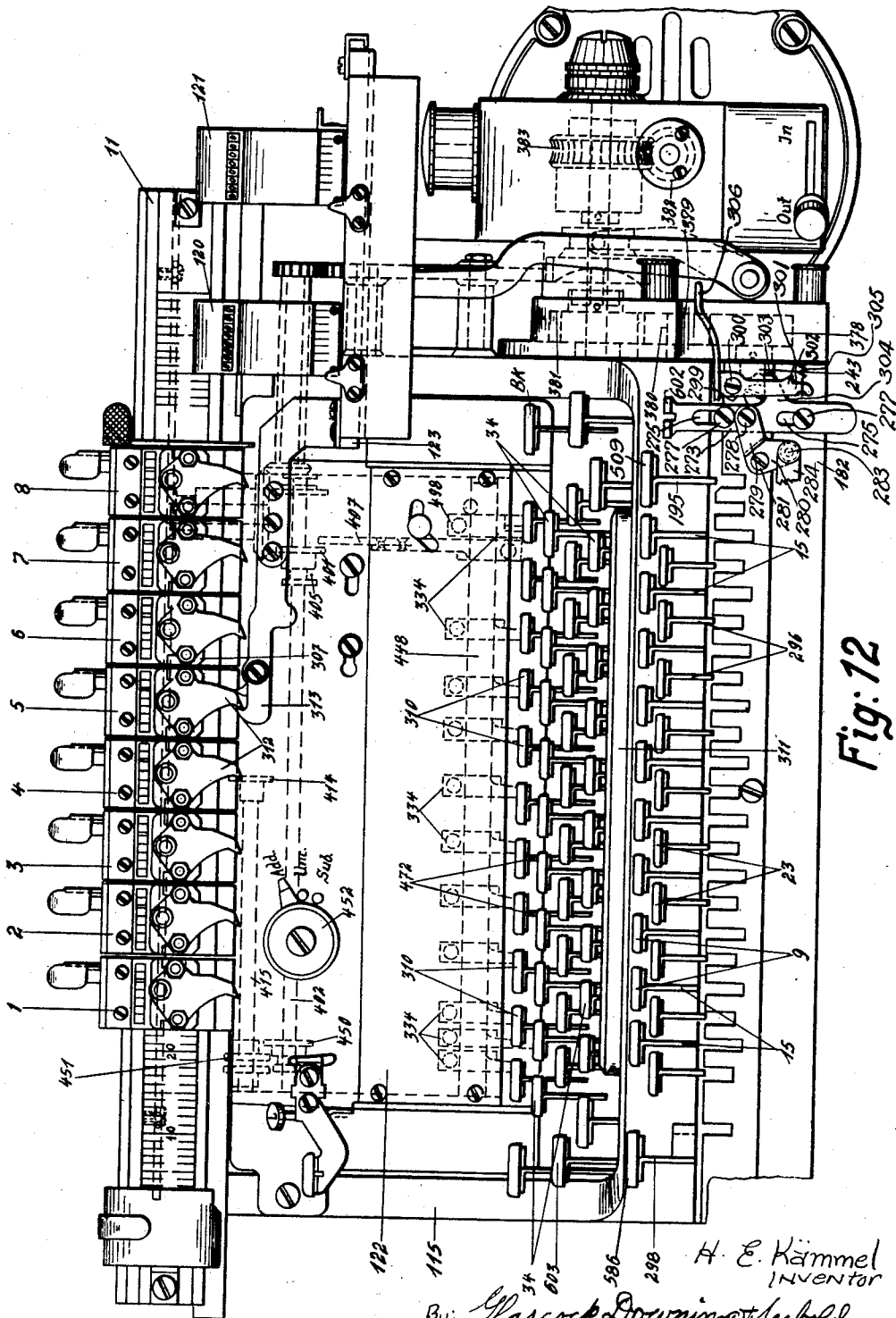


Fig. 12

H. E. Kämmel
INVENTOR
By: Glascock Downing & Seabold
Attys.

Jan. 9, 1940.

H. E. KÄMMEL

2,186,642

TYPEWRITING-CALCULATING MACHINE OR THE LIKE WITH TOTAL-TAKING MECHANISM

Filed Dec. 10, 1935

20 Sheets-Sheet 10

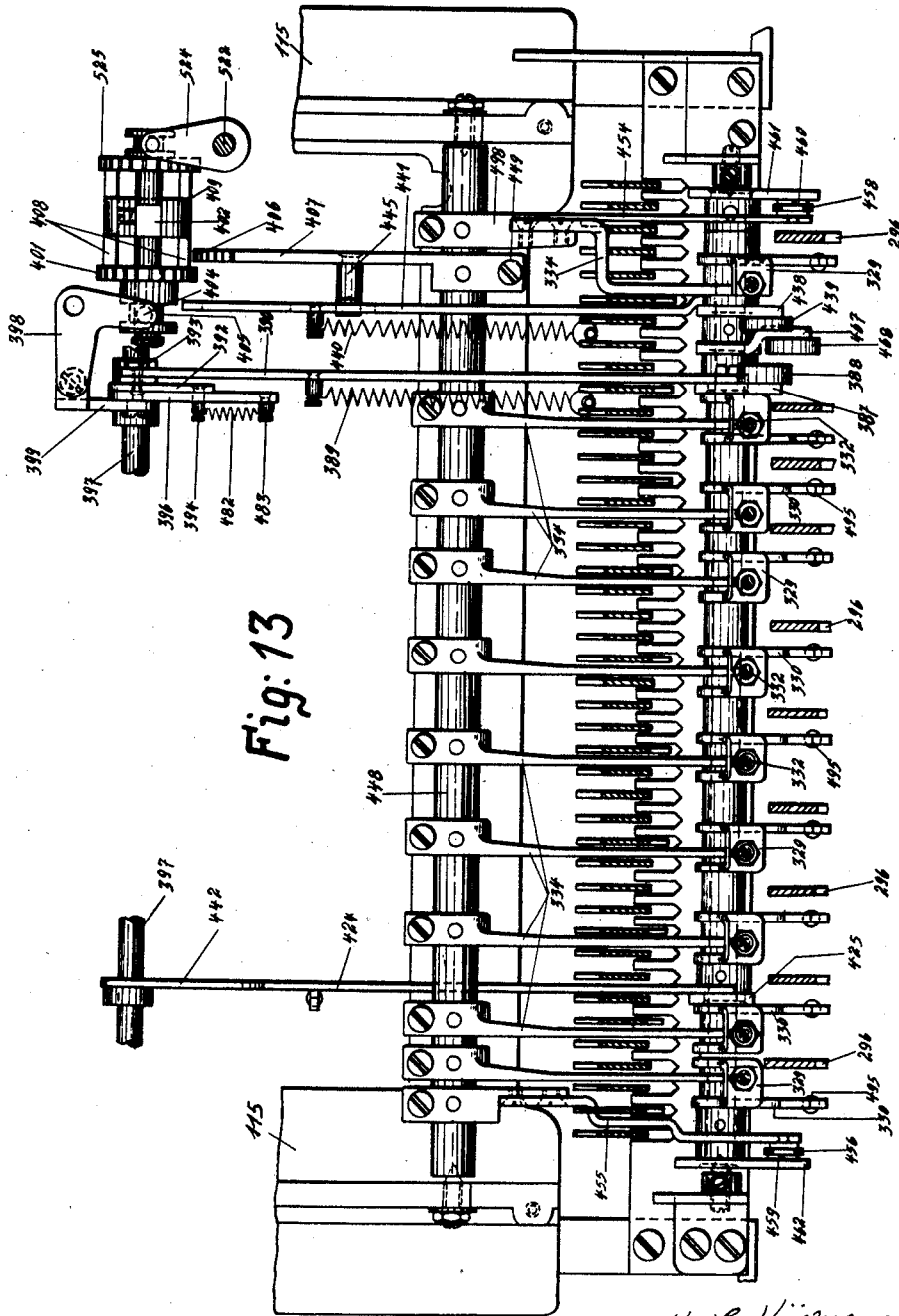


Fig. 13

H. E. Kämmel
INVENTOR

By: Gascoyne Downings & Leebold
ATTYS.

Jan. 9, 1940.

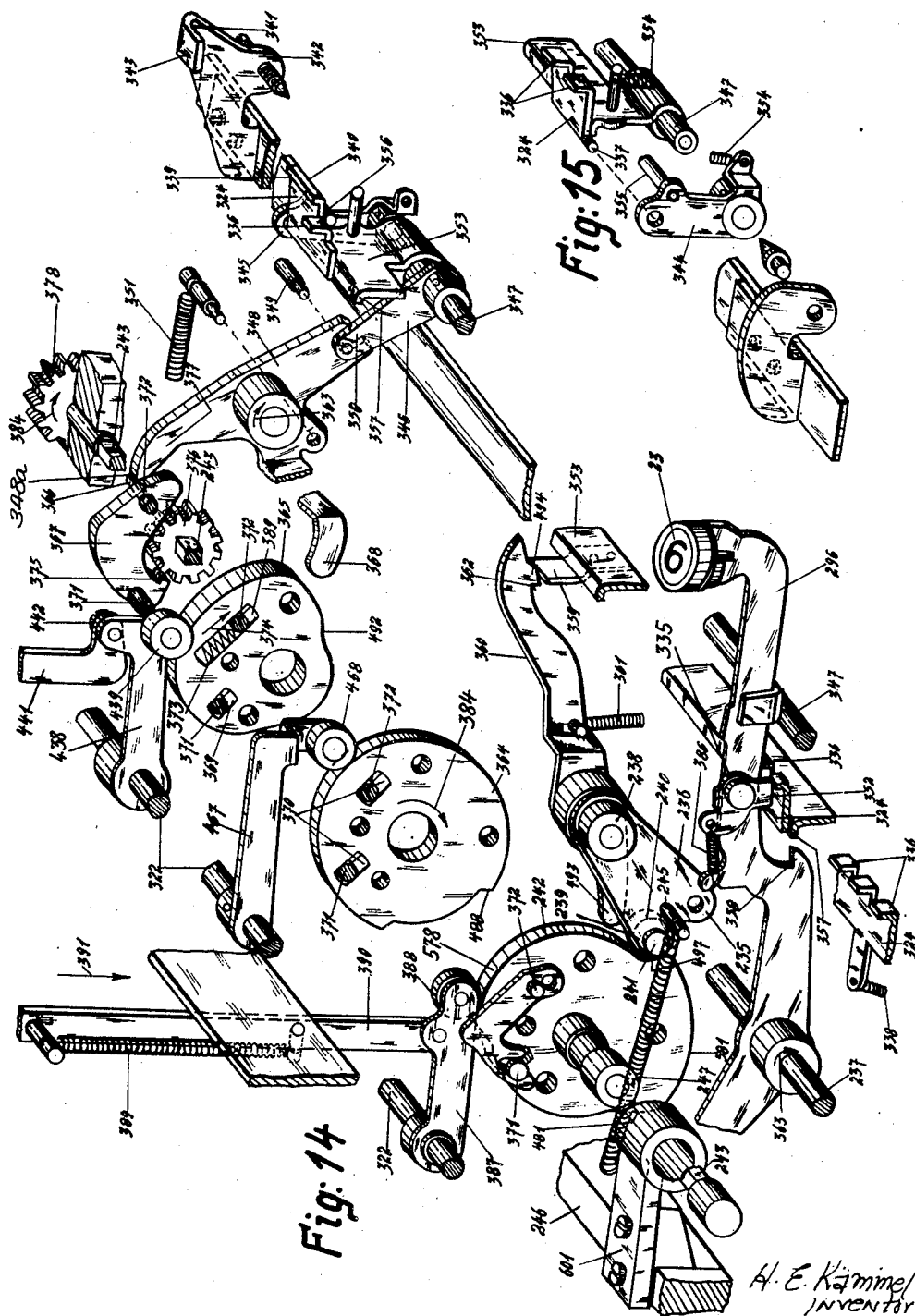
H. E. KÄMMEL

2,186,642

TYPEWRITING-CALCULATING MACHINE OR THE LIKE WITH TOTAL-TAKING MECHANISM

Filed Dec. 10, 1935

20 Sheets-Sheet 11



H. E. Kämmel
INVENTOR
By *Glascok Downing*
Attys.

Jan. 9, 1940.

H. E. KÄMMEL

2,186,642

TYPEWRITING-CALCULATING MACHINE OR THE LIKE WITH TOTAL-TAKING MECHANISM

Filed Dec. 10, 1935

20 Sheets-Sheet 12

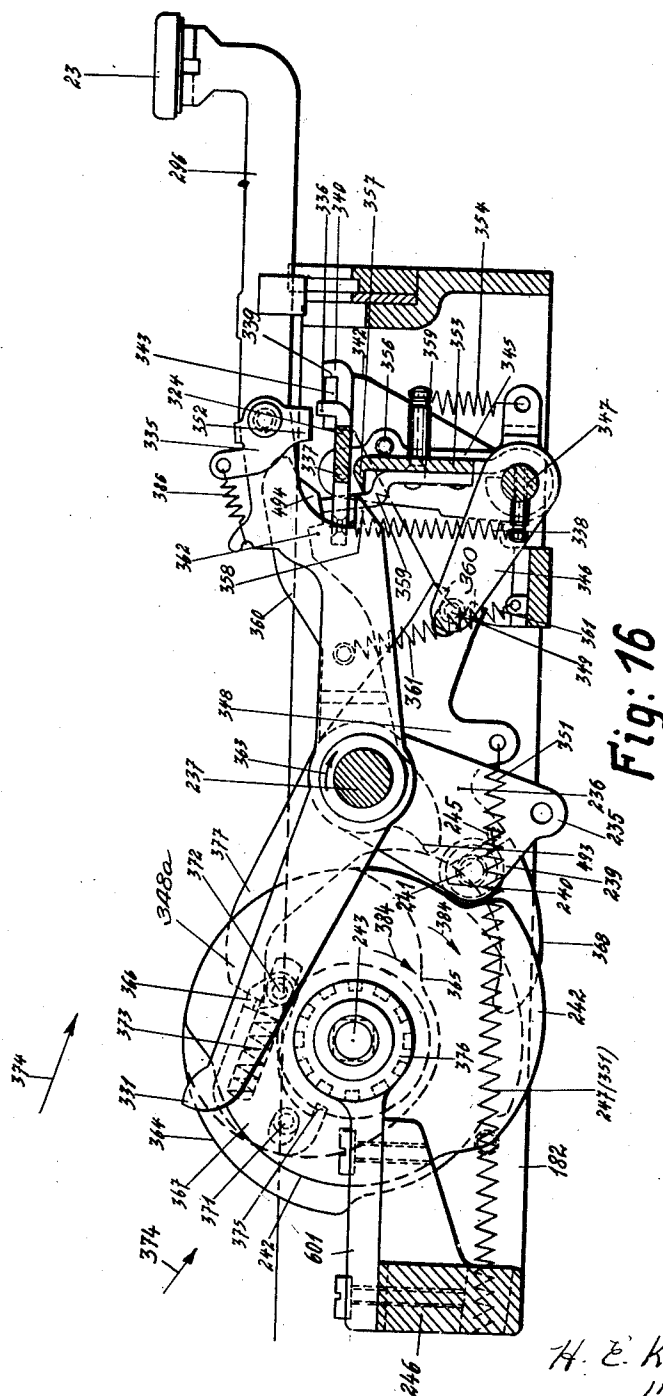


Fig: 16

H. E. Kämmer
Inventor

By: Glascop Downing & Seibold
Attys.

Jan. 9, 1940.

H. E. KÄMMEL

2,186,642

TYPEWRITING-CALCULATING MACHINE OR THE LIKE WITH TOTAL-TAKING MECHANISM

Filed Dec. 10, 1935

20 Sheets-Sheet 13

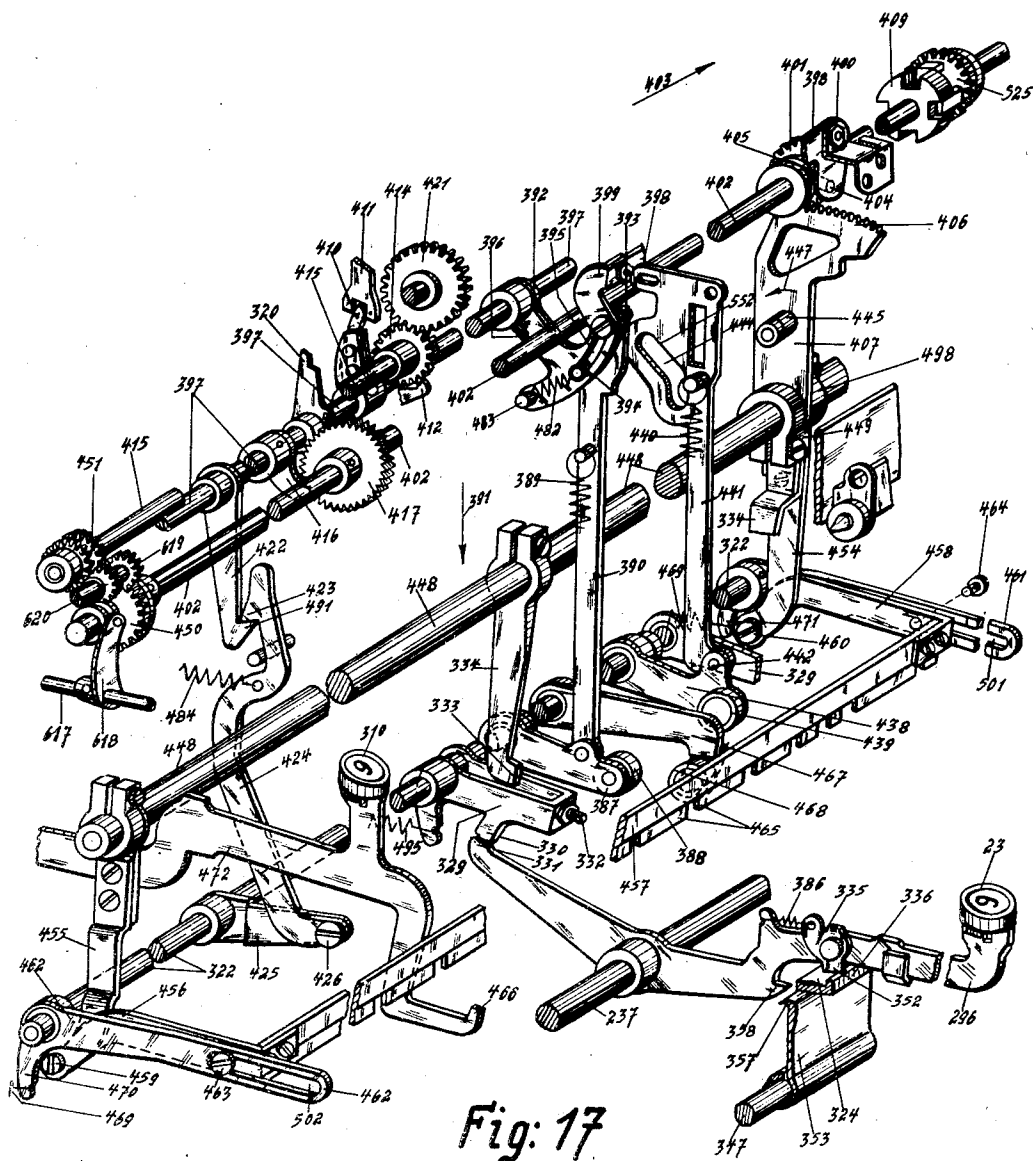


Fig: 17

H. E. Kämmel
INVENTOR

By: *Glascock Downing & Seebold*
Attys.

Jan. 9, 1940.

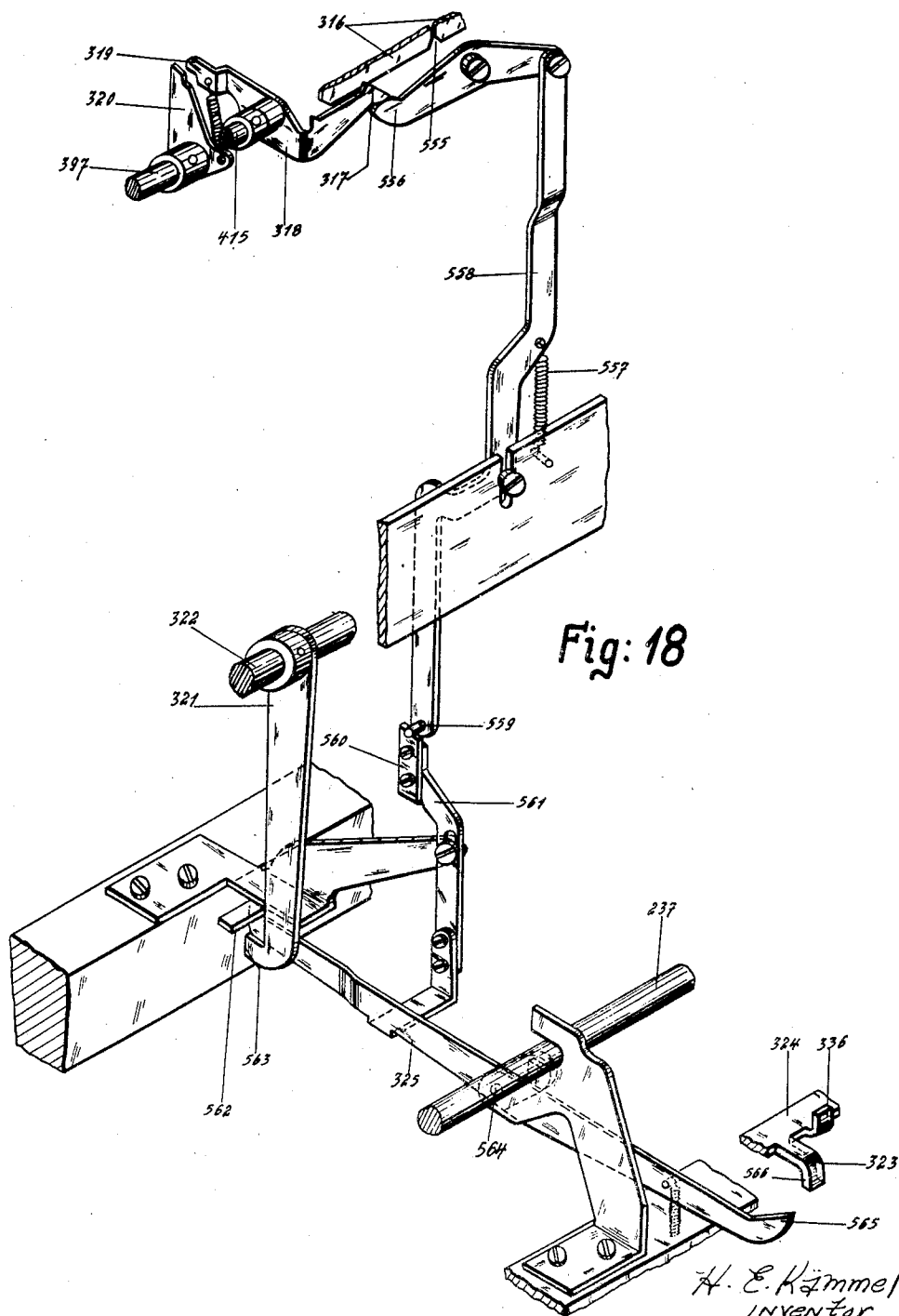
H. E. KÄMMEL

2,186,642

TYPEWRITING-CALCULATING MACHINE OR THE LIKE WITH TOTAL-TAKING MECHANISM

Filed Dec. 10, 1935

20 Sheets-Sheet 14



By: *Glascott Downing & Deibold*
Attys.

Jan. 9, 1940.

H. E. KÄMMEL

2,186,642

TYPEWRITING-CALCULATING MACHINE OR THE LIKE WITH TOTAL-TAKING MECHANISM

Filed Dec. 10, 1935

20 Sheets-Sheet 15

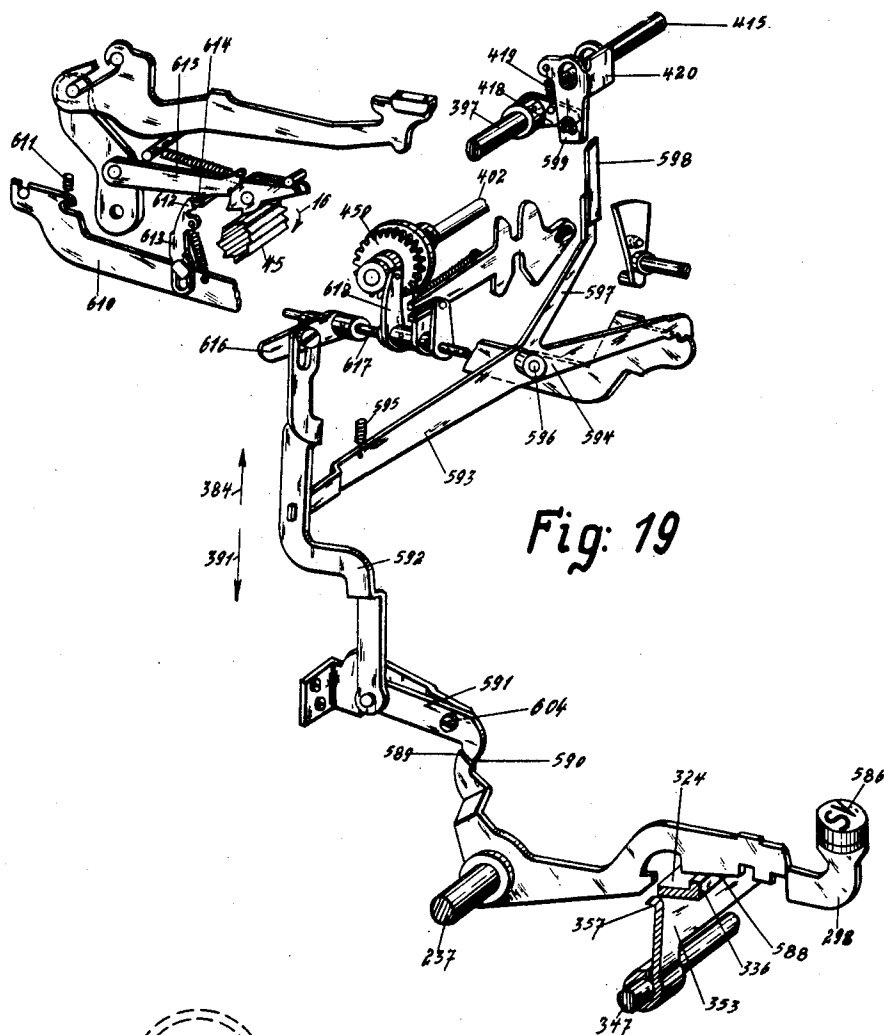


Fig: 19

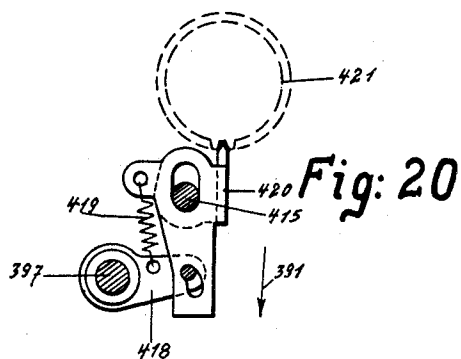


Fig: 20

H. E. Kämmel
inventor

By: *Glascopp Downings & Seabold*
Attys.

Jan. 9, 1940.

H. E. KÄMMEL

2,186,642

TYPEWRITING-CALCULATING MACHINE OR THE LIKE WITH TOTAL-TAKING MECHANISM

Filed Dec. 10, 1935

20 Sheets-Sheet 16

Fig: 22

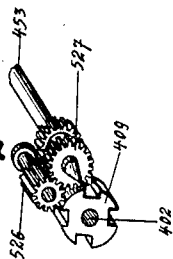
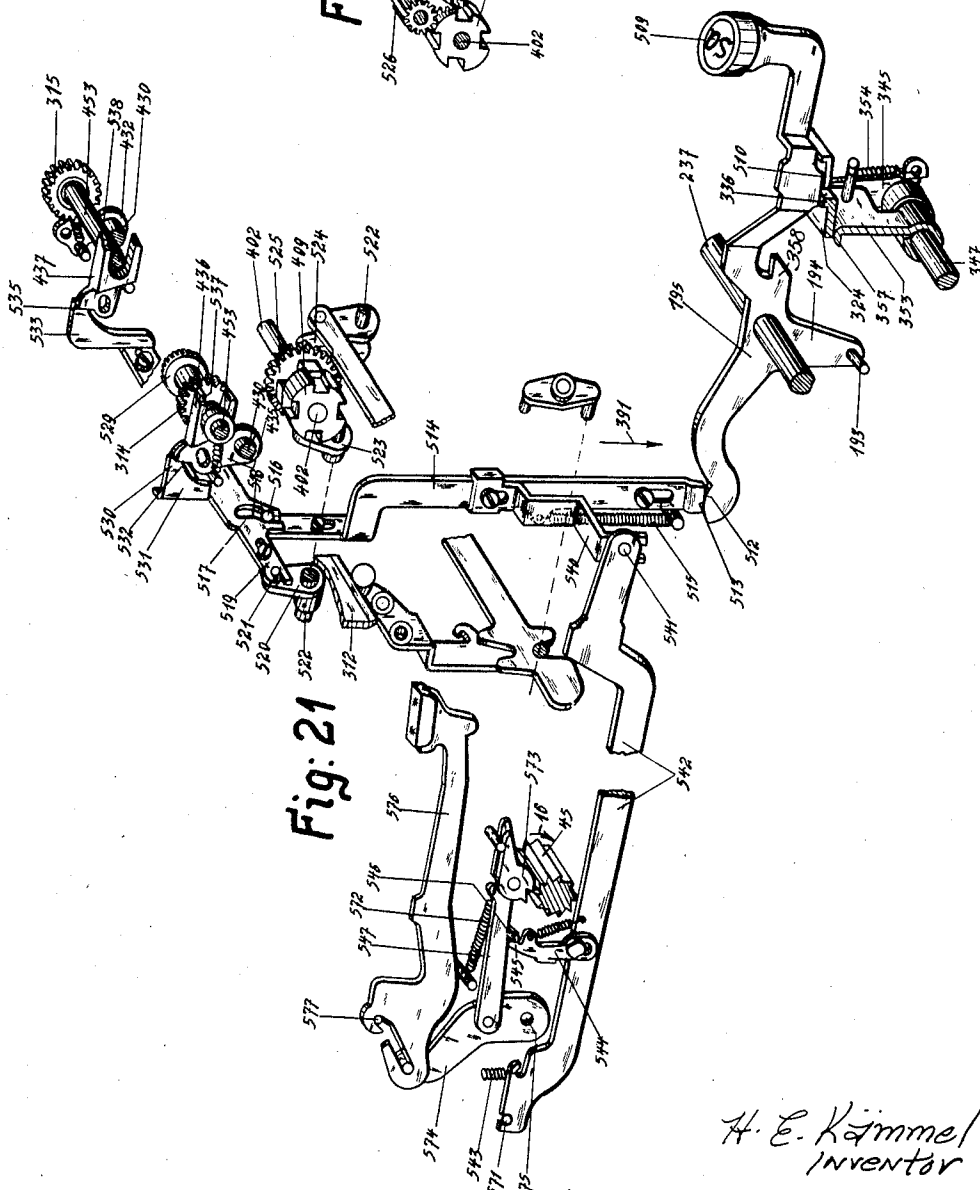


Fig: 21

H. E. Kimmel
Inventor
By: *Clascock Downing & Seebold*
Atty's.

Jan. 9, 1940.

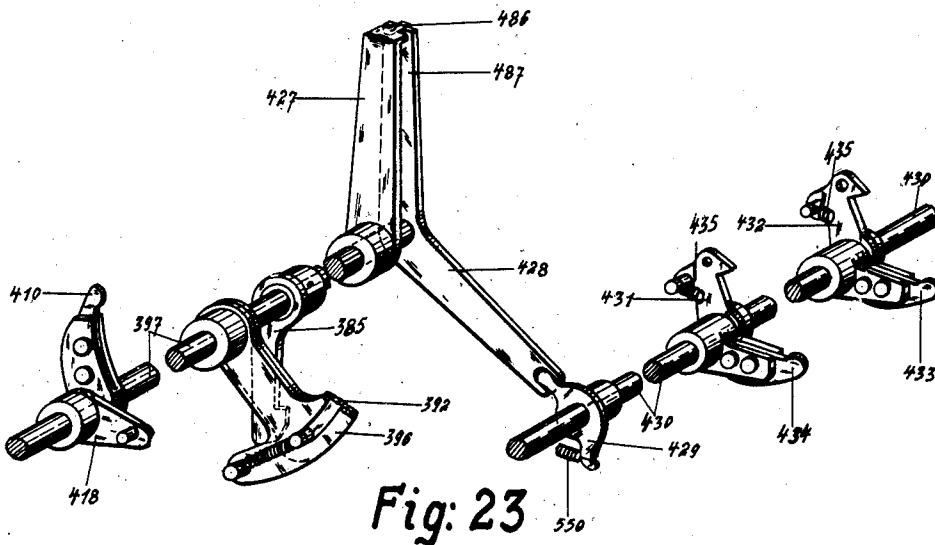
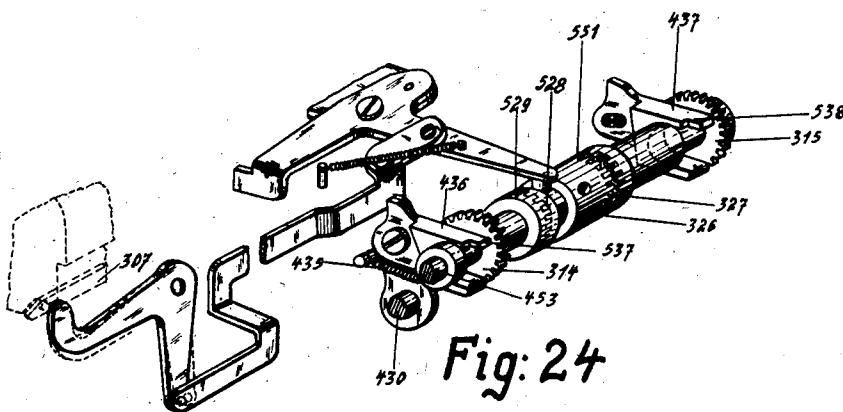
H. E. KÄMMEL

2,186,642

TYPEWRITING-CALCULATING MACHINE OR THE LIKE WITH TOTAL-TAKING MECHANISM

Filed Dec. 10, 1935

20 Sheets-Sheet 17



H. E. Kämmel,
INVENTOR

By: *Glascop Downing & Seebold*
Attys.

Jan. 9, 1940.

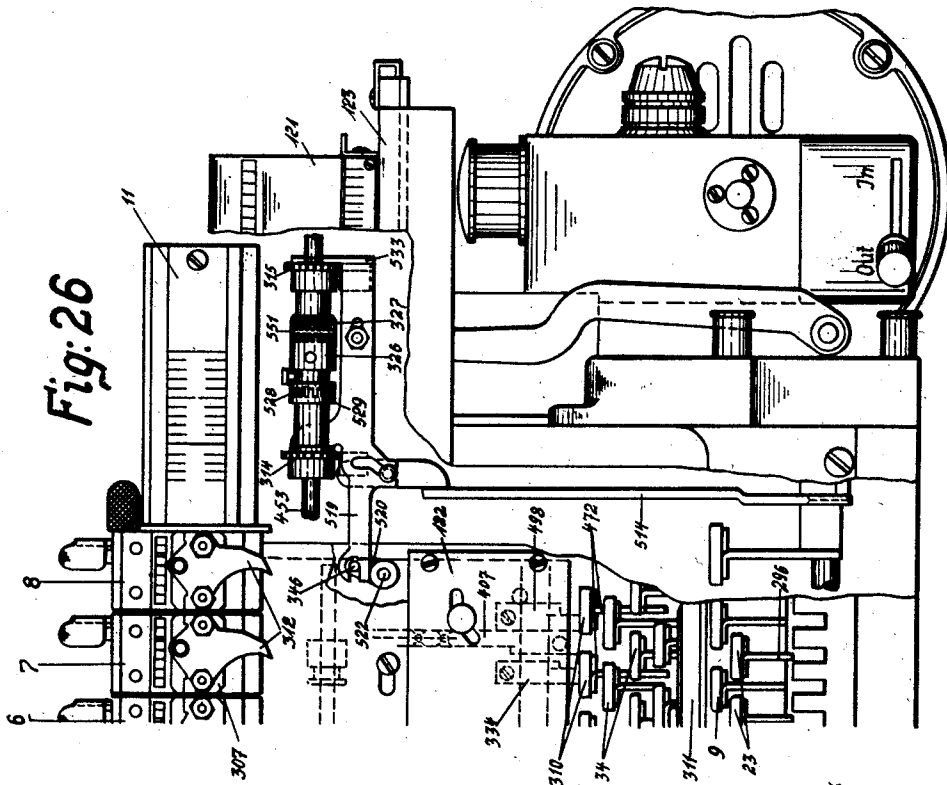
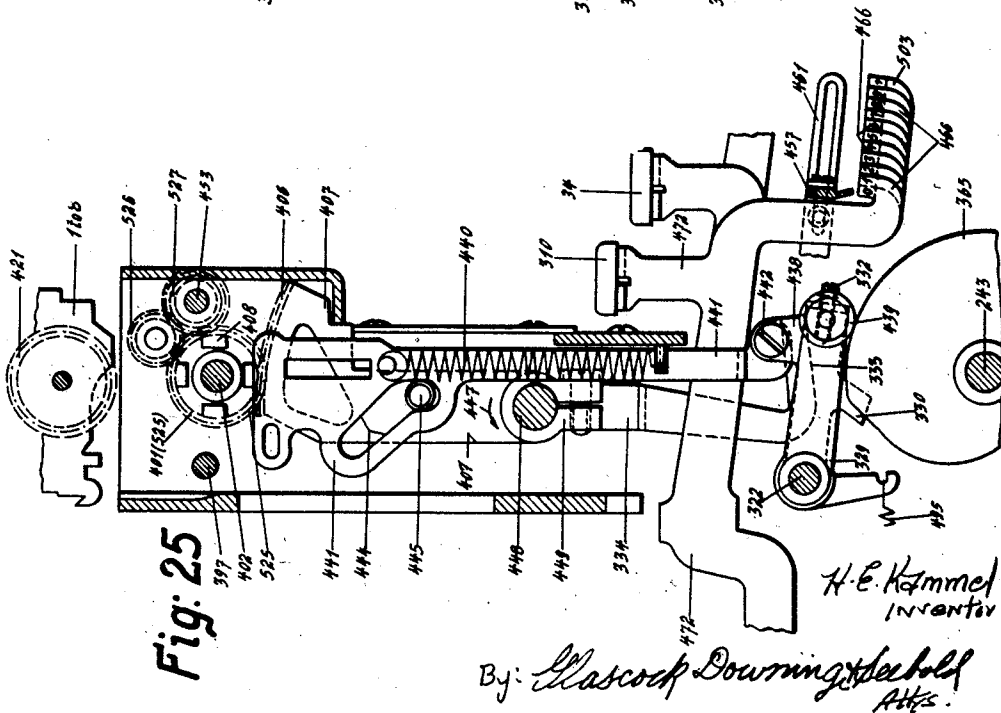
H. E. KÄMMEL

2,186,642

TYPEWRITING-CALCULATING MACHINE OR THE LIKE WITH TOTAL-TAKING MECHANISM

Filed Dec. 10, 1935

20 Sheets-Sheet 18



H. E. Kämmel
Inventor
By: *Clascock Downing & Seibold*
Attys.

Jan. 9, 1940.

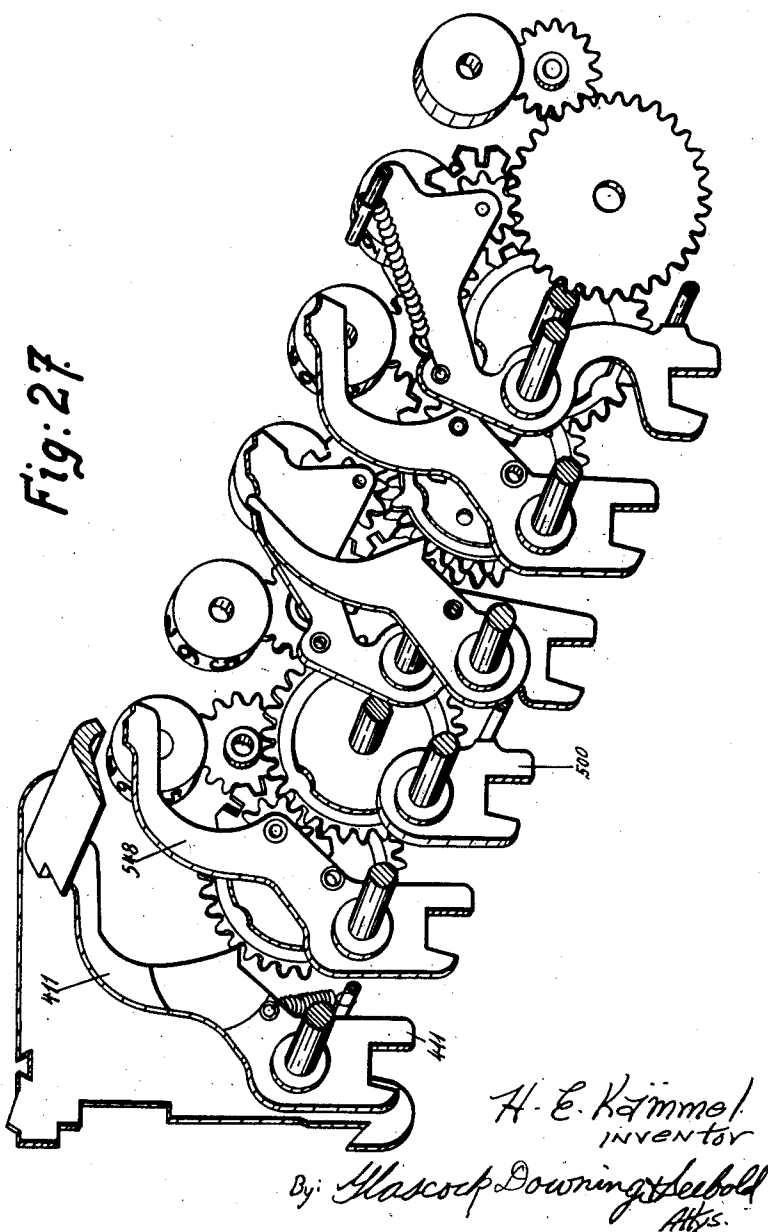
H. E. KÄMMEL

2,186,642

TYPEWRITING-CALCULATING MACHINE OR THE LIKE WITH TOTAL-TAKING MECHANISM

Filed Dec. 10, 1935

20 Sheets-Sheet 19



Jan. 9, 1940.

H. E. KÄMMEL

2,186,642

TYPEWRITING-CALCULATING MACHINE OR THE LIKE WITH TOTAL-TAKING MECHANISM.

Filed Dec. 10, 1935

20 Sheets-Sheet 20

	1	2	3	4	5	6	7	8	9	10	11
	Name	No	Month	Gross Salary	Taxes	Sick-fund	Insurance for employees	Supplements	Remainder	Net Salary	Sum of all supplements
I	O. Schmidt	15	Mai	200.00	10.00	6.00	4.00	3.75	0.55	184.30 *	4.50 *

Fig. 28.

Typing line	Col.	No. Column Totalizer	Reading Column Totalizer	Type of Calc. Cross Totlr. Q1	Type of Calc. Cross Totlr. Q2	Reading Cross Totalizer Q1	Reading Cross Totalizer Q2	Clearsign from Cross Totlr.
I	1 to 3	Name, number and month have to be registered.						
I	4	1	200.00	A	E	200.00	Zero	
I	5	2	10.00	S	E	190.00	Zero	
I	6	3	6.00	S	E	184.00	Zero	
I	7	4	4.00	S	E	180.00	Zero	
I	8	5	3.75	A	A	183.75	3.75	
I	9	6	0.55	A	A	184.30	4.30	
I	10	7	184.30	S	E	comes to zero	4.30	Q1
I	11	8	4.30	E	S	Zero	comes to zero	Q2

Fig. 29.

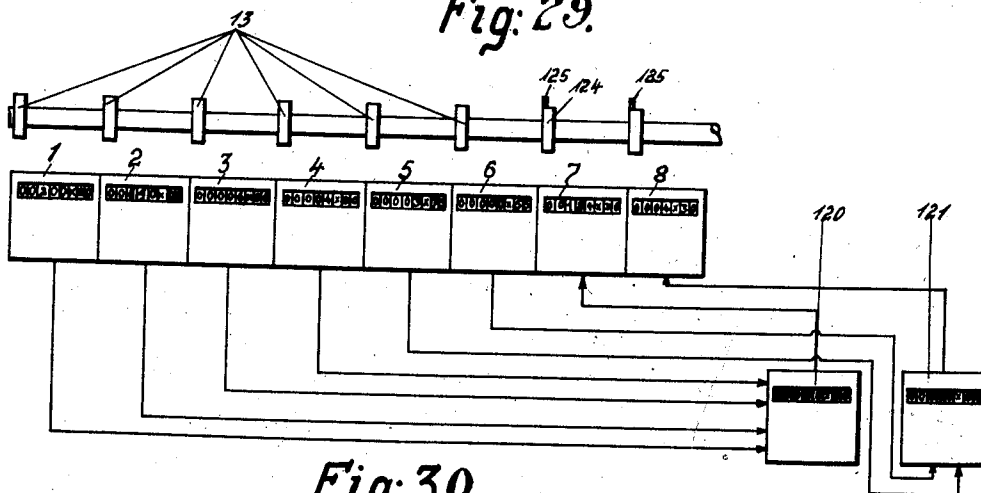


Fig. 30.

H. E. Kämmel
INVENTOR

By: *Clasch Downing & Sebold*
ATTYS.

UNITED STATES PATENT OFFICE

2,186,642

TYPEWRITING-CALCULATING MACHINE OR
THE LIKE WITH TOTAL-TAKING MECH-
ANISM

Hugo Ernst Kämmler, Zella-Mehlis, Germany, as-
signor to Mercedes Buromaschinen - Werke
Aktiengesellschaft, Zella-Mehlis, Thuringia,
Germany

Application December 10, 1935, Serial No. 53,805
In Germany December 11, 1934

6 Claims. (Cl. 235—59)

The invention relates to typewriting-calculating machines or the like with total-taking mechanism.

Mechanisms of this type are already known.

5 If in a mechanism of this type the total is to be taken from any totalizer, the totalizer concerned must be brought first into the working position by depression of the tabulator key and then the total-taking key must be depressed whereby time
10 is lost.

According to the invention these known mechanisms are improved by effecting the initiation of the total-taking automatically in dependence upon the carriage movement, so that an extremely
15 rapid operation is rendered possible. The total-taking member is brought advantageously into its working position in dependence upon the tabulator mechanism and preferably is capable of being locked in its working position.

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

25 Figures 1 to 6 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 in which the tabulating mechanisms are enclosed by building.

30 Fig. 2 shows a partial plan view of the machine according to Fig. 1.

Fig. 3 shows in perspective details of the tabulating device according to Fig. 1 viewed from the front left-hand side of the machine.

35 Fig. 4 shows in perspective a detail of Fig. 3, in which view the detail parts are illustrated in a condition separated from one another.

Fig. 5 shows in perspective a further detail of Fig. 3, whereby different parts are represented
40 drawn out from one another.

Fig. 6 shows a perspective illustration of parts of the shift mechanism.

Fig. 7 shows a left-hand side elevation of a typewriting-calculating machine in which the mechanism according to the invention is incor-
45 porated.

Fig. 8 shows a plan of the mechanism according to the invention in which for the sake of completeness, parts of the machine frame are
50 indicated.

Fig. 9 shows an elevation in perspective of the mechanism viewed from left-hand front of the machine, in which different parts for purposes of better illustration are represented drawn out
55 from one another.

Fig. 10 shows a front elevation of a detail of the subject-matter of the invention.

Fig. 11 shows a special form of construction of the detail according to Fig. 10.

Fig. 12 shows a front elevation of the whole
5 typewriting-calculating machine.

Fig. 13 shows a front elevation towards the calculating members together with the calculating segment and a part of the change over gear for the cross totalizers, in which view the number
10 typing keys and the letter typing keys are represented in section.

Fig. 14 shows a perspective illustration viewed from the front left hand side of the machine, of the drive coupling with the setting member, com-
15 mon 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.

Fig. 15 shows in perspective, details of the set-
20 ting member, the parts of which are likewise drawn out from one another.

Fig. 16 shows on an enlarged scale a section according to the line 16—16 of Figure 8, viewed from the left of the figure.
25

Fig. 17 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
30 totalizers and a part of the change over gear for the cross totalizers, in which view the individual parts are illustrated drawn out from one another.

Fig. 18 shows a perspective illustration of a
35 locking mechanism controlled by the column totalizer.

Fig. 19 shows a perspective illustration of the total taking mechanism for the column totalizers viewed from the front left-hand side of the machine together with a part of the change over
40 gear for the column totalizers and the printing mechanism for the sign for taking totals from the column totalizers, in which view the parts are illustrated partially drawn out from one an-
45 other.

Fig. 20 shows a detail part of Figure 19 on an enlarged scale.

Fig. 21 shows a perspective illustration of the total taking mechanism for the cross totalizers, with the printing mechanism for the sign in
50 addition thereto and a part of the change over gear including both the driving wheels for the cross totalizers, the view being taken from the front left-hand side of the machine and various
55

parts being illustrated drawn out from one another.

Fig. 22 shows in perspective the change over gear for the cross totalizers viewed from the front left-hand side of the machine.

Fig. 23 shows in perspective the unlocking mechanisms for the column and cross totalizers, viewed from the front left-hand side of the machine.

Fig. 24 shows in perspective the control, known in itself, for the coupling arranged between both the driving wheels of the cross totalizers, viewed from the front left-hand side of the machine.

Fig. 25 shows in section detail parts of the value transmitting mechanism according to Figure 17.

Fig. 26 shows a partial front elevation of the machine, in which view parts of the machine housing are broken off in order to disclose the mechanisms of the total taking arrangement for the cross totalizers, together with the driving mechanism for the same.

Fig. 27 shows a perspective arrangement of a totalizer viewed from the rear, in which view the detail parts are illustrated in a condition separated from one another.

Fig. 28 shows a partial representation of a sheet with a numerical example entered thereon which will be used in the explanation of the manner of working.

Fig. 29 shows a table for the setting of the totalizers for the type of calculation of the cross totalizers according to the numerical example represented in Fig. 28.

Fig. 30 shows diagrammatically the arrangement of the totalizers with the tabulator riders associated with them.

General description

On the machine frame 115 (Figs. 1 and 7) the carriage 10 with its platen 118 is displaceably mounted on the rails 116 and 117. The totalizers 1 to 8 (Figs. 1, 7, 12 and 13) are mounted so as to be readily attachable and detachable on a rail 11 fixed to the carriage frame 119. The carriage 10 is continuously acted upon by a spring operated draw band (not shown) from right to left (Fig. 12). By means of an escapement mechanism described in the U. S. patent to Gustav Mez, No. 2,046,524, dated July 7, 1936, the carriage 10 is moved one step toward the left on each key stroke.

At the front of the machine, a row of number keys 310 is arranged. By means of these keys, values are typed upon the platen 118 but are not inserted into the totalizers 1 to 8 and the crossfooters 120 and 121, which latter are arranged on a carriage 123 displaceable along the calculating mechanism 122. The letter keys 34, which are arranged below the number keys 310 in the keyboard, serve for the writing of clear text. The space key 311 (Figures 12 and 26) is located in front of the letter keys 34. By means of this space key 311, when depressed, the paper carriage 10 may be selectively moved one or more steps to the left.

Below the usual keyboard, the tabulator keys 9 (Figs. 1, 2, 3, 7, 8, 12 and 26) are arranged in the supporting frame 182. If one of the tabulating keys 9 is depressed, one of the column totalizers 1 to 8 is brought with a certain denomination into the desired calculating position, whereby the carriage 10 is released. According to the invention, when a tabulator key 9 is depressed, the TC key 509 (Figs. 7, 8, 9, 10 and 12) is auto-

matically depressed whereby the values previously calculated and registered in the crossfooters 120 and 121 by depression of the calculating keys 23, are automatically written out of the crossfooters 120 and 121 and transferred into corresponding column totalizers.

Below the tabulator keys 9, the calculating keys 23 are arranged in the supporting frame 182. By depression of the keys 23 values are transmitted into the totalizers 1 to 8 and into the crossfooters 120 and 121 and the corresponding values are simultaneously typed upon the platen 118.

Besides, the calculating keys 23 and the tabulator keys 9, a key 586 provided with the mark "T. V." is arranged on the left-hand side in the supporting frame 182 of the machine. This key 586 serves for total taking from the totalizers 1 to 8. On the righthand side of the machine a key 602 (Figs. 8 and 10) provided with the mark "T. V. Prep." is arranged in the supporting frame 182. This key 602 serves, when depressed, to lock the calculating keys 23 and to unlock the T. V. key 586. If the T. V. Prep. key 602 is depressed, the same is locked in its depressed position. In order to make this lock inoperative, a key 306 is swingably arranged on the supporting frame 182 of the machine.

The T. C. key 509 is arranged on the front of the supporting frame 182 of the machine for taking totals from the crossfooters 120 and 121.

On the right hand side of the paper carriage 10, a carriage release lever CR (Figs. 1 and 7) is arranged. By depression of this key CR, the carriage 10 is released as described in the above mentioned Mez patent.

Further, on the left hand side in the keyboard of the machine, a carriage return key 603 (Fig. 12) is provided. If this key is depressed, the paper carriage 10 is automatically moved into its extreme right hand position. Finally, a back-space key BK is arranged on the left hand side of the keyboard. By depression of this key BK the carriage may be selectively moved one or more steps to the right.

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 1 to 8 (Figs. 1, 7, 12, 26 and 30) is to be brought with a certain denomination into the calculating position, the tabulator key 9 (Figs. 1 to 3, 7 and 8) of the denomination tabulator corresponding to this denomination is depressed, whereby the carriage 10 is released, and is moved to the left until the totalizer concerned, which is fixed to the carrying rail 11, is brought into the calculating position through striking of the pre-set rider 13, correspondingly arranged to this totalizer on the rider shaft 12, against the column selecting lever 14 (Figs. 1, 3, 5, 7) corresponding to the depressed tabulator key 9.

On the depression of a tabulator key 9 (Figs. 1, 2, 3 and 7) of the denomination tabulator, the tabulator key lever 15 is moved in the arrow direction 16 round the shaft 17 (Figs. 1 and 3), whereby the associated column selecting lever 14 is raised. The locking yoke 18 (Figs. 1, 3 and 5) thereby moves out of the upper stop 19 of the column selecting lever 14, which is possible without difficulty, in consequence of the spring 21 which engages with the arm 20 of the locking yoke 18. In consequence of this arrangement, however, the locking yoke 18 is capable of entering automatically into the lower stop 19 of the column selecting lever 14, whereby the same is

held in its upper position so that the tabulator key 9 on raising of the finger from the key remains consequently in its depressed position.

By the depression of the tabulator key 9, however, the shift bridge 24 (Figs. 1 to 3) positioned under the tabulator key levers 15, has likewise been swung in the arrow direction 16 round the bearing points 25 and 26.

The arm 30 (Figs. 1 and 3) which engages with its roller 27 under the arm 28 of the auxiliary lever 29 thereby transmits the movement to the auxiliary lever 29 which is swung in the arrow direction 16 round the bearing bar 31. The auxiliary lever 29 thereby enters with its nose 32 into the roller key lock 33 as usual in the Mercedes typewriting and typewriter calculating machines (Figs. 1 and 2), whereby all the typing keys 34 are locked against depression so long as the tabulator key 9 concerned remains in its depressed position. By the swinging movement of the auxiliary lever 29 the lever 37 is swung round its pivot 38 in the clockwise direction by means of the pin 36 which projects into the slot 35 of the auxiliary lever 29. The arm 39 of the lever 37 is thereby drawn away from beneath the nose 40 of the pawl 41. The pawl 41 now swings under the action of the compression spring 42 in the clockwise direction round its bearing pin 43 fixed in the cam, whereby the nose 44 of the pawl 41 is laid into the space standing opposite to it of the rotating cam shaft 45 (Figs. 1 and 3). The cam 46 is therefore rotated in the clockwise direction along with the continually rotating shaft 45, until the latter is disconnected from the cam shaft 45 as follows.

On the movement of the auxiliary lever 29 (Figs. 1 to 3) in the arrow direction 16 the lever 48 is swung in the clockwise direction round its bearing point 49 against the periphery of the cam 46 by the pin-slot connection 47, 600, whereby the nose 50 of the lever 48 moves into the range of the nose 40 of the pawl 41. If, according to the foregoing a rotation of the cam 46 results in the arrow direction 16, the rotation of the same is interrupted after one half-revolution by the striking of the nose 40 of the pawl 41 against the nose 50 of the lever 48 lying in its path of movement, whereby the nose 44 is brought out of engagement with the cam shaft 45. In the rotation of the cam 46 which is mounted eccentrically to the cam shaft 45, this cam slides with its periphery over the roller 53 mounted on the arm 51 of the lever 52, and swings the lever 52 in the clockwise direction round its bearing pin 54. The levers 57 and 58 fixed to the shaft 56 are swung by way of the rod 55 also in the same direction. Consequently, the angle lever 59 is swung by way of the pin-slot connection 60, 61 in the anti-clockwise direction against the action of its spring 62 (Figs. 1 and 3), whereby its arm 63 acts on the nose 64 (Fig. 4) of the lever 65. This is now swung with its bearing member 66 and the shaft 67 in the arrow direction 68 (Figs. 1 and 3).

During this swinging movement of the lever 65 in the arrow direction 68 the pin 69 (Figs. 1 to 3 and 4) fixed thereto slides away from the nose 70 of the locking lever 71, whereon the lever 71 under the action of its spring 72 is laid with its edge 73 in front of the pin 69 of the lever 65. The lever 65, together with the shaft 67 and all the parts fixed to the latter, are thereby held in their swung position.

Even without the lock 69, 71 the part 65, 66 together with the shaft 67 are held in their

swung position by the cam 46, which, as the tabulator key lever 9 remains in its depressed position, is held after one-half revolution, so that rods 52, 55, 57, 58, 59 (Figure 3) and therewith the lever 65 are held positively in their swung position until the tabulator key lever 9 can again move upwards, which will occur when the rider 13 (Figs. 1 and 7) located on the carriage, runs against the raised column selecting lever.

The shift lever 74 (Figs. 1, 2 and 3) fixed on the shaft 67, has naturally been swung in the arrow direction 68 along with the lever 65, 66. The shift lever 74 presses in its turn on the nose 75 (Fig. 6) of the lever 77 fixed on the shaft 76 which latter lever on its part acts with the part 79 screwed to its lug 78 on the arm 80 of the angle lever 81 and swings the latter in the clockwise direction round the bearing screw 82. The arm 83 of the angle lever 81 thereby presses against the nose 84 of the shift tooth 86 loosely mounted on the shift rocker 85, and by swinging round the bearing screw 87 brings this out of engagement with the shift wheel 88, whereby the carriage movement to the left takes place.

The shift lever 89 (Fig. 5) fixed on the shaft 67 was likewise swung in the arrow direction 68, whereby the pin 90 of the arm 91 of the lever 89 takes along with it the locking bridge 92 (Figs. 3 and 5) together with its locking bar 18 against the action of the spring 21 by striking on the arm 20. The second locking bridge 93 (Figs. 2, 3 and 5) arranged loosely on the shaft 67 is carried along in the same direction by means of the spring 96 which is connected on the one hand to the pin 94 of the bridge 93, and on the other hand to the lug 95 of the lever 89. In the swinging of the shaft 67 in the arrow direction 68 the locking bar 18 acting only on the raising of the column selecting lever 14 is therefore moved out of the working position in relation to the same, whilst the other locking bridge 93 moves into the working position in relation to the column selecting lever, and takes over the holding of the same by entering into the lower stop 97.

According to the foregoing, however, the paper carriage 10 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 98 (Fig. 3) in the arrow direction 68 is brought into the working position by the curved slot connection 99, 100, by way of the lever 101 actuated thereby.

In the said movement of the carriage to the left the rider 13 arranged on the rider shaft 12 of the carriage 10 correspondingly to the totalizer moving into the working position strikes on the raised column selecting lever 14 (Fig. 1) corresponding to the depressed tabulator key 9. All the column selecting levers 14 mounted between the lever 89 and the adjusting collar 102 80 (Fig. 2) together with the shaft 67 and all the parts fastened thereon, are thereby displaced in the arrow direction 104 (Figs. 2 and 3) against the action of the spring 103.

In this displacement the lever 65 through being displaced along with the bearing piece 66 strikes with its nose on the pin 105 (Figs. 2, 3 and 4) fixed to the bearing rail and is swung first of all in the arrow direction 106 round the bearing screw 107 against the action of the spring 108.

The pin 69 which under the influence of the spring 109 has been laid against the edge 73 of the lever 71 (Figs. 3 and 4) now moves in a lateral direction out of the range of the locking 75

lever 71, so that the lever 65 and its bearing 66, together with the shaft 67 and all the parts attached to the latter, are now swung back by the spring 109 in the opposite direction to the arrow direction 68 (Figs. 1, 3 and 4) into their rest position, whereby the locking bridge 93 releases again the column selecting lever 14 which up to this point has been held fast.

Since, however, at this moment the locking bridge 18 swings likewise in the opposite direction of the arrow 68 under the action of its spring 21, it could happen that the same engages in the lower stop 19 of the column selecting lever 14 before this could move downwards. In order to prevent this undesired occurrence, the inclined nose 110 (Figs. 2 and 3) is provided on the lever 111 on which runs up the arm 112 of the locking bridge 18, so that the locking bridge 18 is at first prevented from performing a swinging movement in the opposite direction of the arrow 68. Meanwhile, however, by the displacement of the shaft 67 in the arrow direction 104 the lever 74 (Fig. 3) fixed on the shaft 67 has slid away from the nose 75 (Fig. 6) of the part 77 so that the parts 77, 81, were released and consequently the loose shift tooth 86 could engage with the shift wheel 88, whereby this now takes over the holding of the carriage. This follows simultaneously with the swinging of the shaft 67 in the opposite direction of the arrow 68, i. e., at the instant when the pin 69 leaves the locking lever 71 in the arrow direction 104.

As soon as the column selecting lever 14 under the action of the tabulator key lever spring, not illustrated, has moved downwards the bridge 24 and the auxiliary lever 29 were brought back into their rest position by means of the spring 113 (Figs. 1 and 3) engaging with the auxiliary lever 29, whereby the nose 50 of the angle lever 48 releases the coupling pawl 41, which up to this point was held fast, and swings the nose 39 of the lever 37 again into the rotational path of the coupling pawl 41 so that the disc 46 performs its second half-revolution after which it comes to a standstill again as the noses 40 of the coupling pawl 41 runs up on the nose 39 of the lever 37. During this half-revolution the rods 52, 55, 57, 58, 59 have arrived again in their rest position by means of the spring 62 engaging with the lever 59.

The releasing conditions of the raised column selecting lever 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 braking 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 67 in the opposite direction of the arrow 68 occurs too early and accordingly the loose shift tooth 86 engages too early with the shift wheel 88, so that when, for example, it is desired to tabulate in the units denomination, without the provision of special means the carriage would yet stop in the tens denomination.

This disadvantage is avoided by the lock 89, 71 which does not permit a swinging of the shaft 67 in the opposite direction of the arrow 68 before the pin 69 has left the lever 71 laterally.

After the pin 69 (Figs. 3 and 4) has moved out of engagement laterally with the lever 71 and

the column selecting lever 14 has taken up its lower position again, the shaft 67 moves back in the opposite direction of the arrow 104 into its rest position under the action of the spring 103 (Fig. 3) and accordingly also the lever 65 (Fig. 4). Simultaneously with this movement the locking yoke 18 (Fig. 5) swings again into its locking position in relation to the column selecting levers 14, while the locking yoke 93 was swung earlier out of its locking position through the action of the lug 95 of the lever 89 on the nose 114 of the locking yoke 93.

The object of the locking yoke 93 (Fig. 5) is to hold the column selecting lever 14 in its raised position until the pin 69 (Fig. 4) is swung laterally out of the locking lever 71, while the locking yoke 18 is still held by the control curve 110 (Figs. 2 and 3) of the lever 111 out of the locking position in relation to the column selecting lever 14 during the return movement of the shaft 67 in the opposite direction of the arrow 104.

Description of the details of the mechanisms concerning the invention

On a tabulator rider shaft 12 fixed to the carriage frame 119 there are mounted besides the normal riders 13 (Fig. 30) special riders 124 (Figs. 1, 7 and 30) which, with their noses 125, are capable of acting on a lever 126 (Figs. 7, 8 and 9). The lever 126 is screwed to a lever 129 by means of screws 127 which engage through the elongated slots 128 of the lever 126. In consequence of the elongated slots 128 the lever 126 is capable of being adjusted in relation to the lever 128. The lever 129 is swingably mounted by means of its hub 130 on a headed screw 132 fixed in a supporting bar 131, and is connected with a link 135 (Figs. 7 and 9) by means of a screw 134 attached to its arms 133. The link 135 is adjustably connected by means of screws 136 and elongated slots 137 (Fig. 9) with a link 138 which on its part is articulately jointed at its bent end 139 to an arm 141 (Figs. 7 and 9) of a lever 142 by means of a screw 140. The lever 142 is swingably mounted by means of its hub 143 (Fig. 9) on a pin 145 fixed in a supporting angle 144 and to its arm 146 is articulately jointed a link 148 by means of a screw 147. The supporting angle 144 is attached at its bent portion 149 to the rear wall 151 of the machine frame 115 by means of screws 150 (Figs. 7 and 9). An adjusting ring 153 clamped by means of a screw 152 (Figs. 7 and 9) to the bearing pin 145 prevents the lever 142 from sliding from off the bolt 145. A lever 157 articulately jointed to the arm 154 of a lever 59 by means of a screw 156 is connected to the link 148 by means of a screw 158. A spring 161 connected on the one hand to the eye 159 of the link 148, and on the other hand to a pin 160 riveted to the lever 157 constantly tends to press the lever 157 against the end 162 (Fig. 9) of the elongated slots 163 of the link 148.

The lever 59 is swingably mounted by means of its hub 167 on a screw 166 which is screwed into a supporting angle 165 (Fig. 9) fixed to the rear wall 151 of the machine frame 115 by means of screws 164.

The lever 157 (Figs. 7 and 9) is capable of co-acting by means of a pin 169 riveted to its lower end 168 with an arm 170 of an angle lever 171. The angle lever 171 is swingably mounted on a screw 173 fixed in a supporting angle 172 which is screwed to the rear wall 151 of the machine frame 115 by means of the screws 174.

The angle lever 171 is capable of acting by means of its arm 175 on a pin 176 of a lever 180 fixed on a shaft 177 by means of a hub 178 and a screw 179. The shaft 177 is rotatably mounted between two pointed pins 181 (Fig. 8) which are arranged in the supporting frame 182, and are prevented from falling out by means of adjustable collars 183 and screws 184. A further lever 185 is fixed on the shaft 177 by means of its hub 186 and a screw 187, and is connected by means of a screw 190 (Figs. 7 and 9) with the end 188 of a link 189. The link 189 engages with the mouth 191 (Fig. 9) of its projection 192 round a pin 193 of an arm 194 of a key lever 195 (Figs. 9 and 21) for the cross totalizer total taking. A spring 196 (Figs. 7 and 8) is connected on the one hand to the link 189, and on the other hand to a spring-connecting pin 198 (Figs. 7 and 8) fixed to the front connecting bridge 197 of the supporting frame 182. The spring 196 acts on the link 189 which at its end 199 (Figs. 7 and 10) is guided in a slot of a lever 273, in the direction of this lever and thereby holds the link 189 in operative connection with the lever 195 by way of the mouth 191 and the pin 193.

By a further spring 200 (Figs. 7, 8 and 10) which is connected on the one hand to a spring-connecting pin 201 riveted into the link 189 (Figs. 7 and 8), and on the other hand to the arm 202 of a fixing plate 203 (Figs. 7 and 10) fixed by means of the screw 204 to the supporting frame 182, the link 189 is continually acted upon in the opposite direction of the arrow 205 (Fig. 7) and holds thereby the T. C. key lever 195 in its rest position against a stop, not illustrated.

Between two supporting angles 209 and 210 (Figs. 7 and 8) which are screwed to the rear connecting bridge 206 (Fig. 8) of the bearing frame 182 by means of screws 207 and 208, is rotatably mounted a shaft 211. To the right-hand side of the shaft 211 is fixed a lever 212 by means of its hub 213 and a set screw 214, and is connected with the end 215 (Fig. 9) of a link 216 by means of a screw 217. An adjustable collar 219 rigidly clamped on the shaft 211 (Fig. 8) by means of the screw 218 holds the shaft 211 together with the lever 212 against lateral displacement. By means of a screw 222 projecting through a slot 221 in the projection 220 (Figs. 7 and 9) of the link 216 which is fixed in an eye 223 (Fig. 9) of the supporting angle 172, the link 216 is guided whereby it is capable of acting on the lever 157, by means of a pin 225 riveted to its other end 224.

On the left-hand side of the shaft 211 an angle lever 226 (Figs. 8 and 9) is fixed by means of its hub 227 and a set screw 228, to the arm 229 (Fig. 9) of which the end 230 of a link 231 is articulately jointed by means of a screw 232 (Figs. 7 to 9). The other end 233 of the link 231 is articulately jointed by means of its screw 234 to one eye 235 (Figs. 7, 14 and 16) of a lever 236 swingably mounted by means of a hub 238 on a shaft 237 mounted in the supporting frame 182. In the other eye 239 of the lever 236 is mounted a rivet 241 (Figs. 8, 14 and 16) on which a roller 240 is rotatable. The roller 240 is capable of co-acting with the cam 242 (Figs. 7 and 8) which is fixed to a driving shaft 243 which is mounted in the supporting frame 182 and a special supporting part 601 (Fig. 16). A spring 247 attached on the one hand to a spring-connecting pin 245 (Figs. 7, 8, 14 and 16) fixed in the lever 236, and on the other hand con-

nected to the middle connecting bridge 246 of the supporting frame 182 is capable of acting on the lever 236 together with the roller 240 and all the parts fixed to the lever so that the roller is constantly pressed against the cam 242.

The lever 226 (Fig. 9) is capable of acting with its arm 248 on the lower end 249 of a slide 250 which is retained and guided by means of two screws 252 and 253 (Figs. 7 and 9) projecting through corresponding slots 251 and screwed into bosses of the rear wall 151. On the slide 250 is displaceably mounted a second slide 254 by means of a screw 256 which projects through its slot 255 and is screwed into the slide 250. Two springs 259 which on the one hand are connected to the lugs 257 of the slide 250, and on the other hand to the lugs 258 of the slide 254, act upon the slide 254 so that the lower end 260 of its slot 255 presses constantly against the screw 256 (Fig. 9), whereby the two slides 250 and 254 act as a single slide and only can be displaced oppositely to one another. The slide 254 is guided at its upper end 261, which is formed as a shift nose, by means of a screw 263 which projects through a curved slot 262 and is screwed into a boss of the back wall 151 of the machine frame 115. On the operation of the slide 254 the upper end 261, which is formed as a shift nose, is capable of co-acting with a special shift wheel 265 (Figs. 7 to 9) fixed on the shift wheel shaft 264. The upper end 261 of the slide 254 is continuously pressed with the face 268 of the curved slot 262 against the screw 263 by means of a spring 267 connected on the one hand to the slide 254, and on the other hand to a spring-connecting screw 266 (Fig. 9) screwed into the rear wall 151 of the machine frame 115. A spring 271 connected on the one hand to a spring pin 269 (Fig. 9) fixed in the slide 250, and on the other hand to a spring-connecting screw 270 fixed in the rear wall 151 of the machine frame 115 draws the slide 250 and with it also the slide 254 so that the upper end 272 of the slot 251 presses continuously against the screw 253.

A key lever 273 (Figs. 7, 8 and 10) in the slot 274 of which the end 199 of the already mentioned link 189 is mounted and guided, is displaceably mounted by means of two screws 277 projecting through the corresponding elongated slots 275 and screwed into the front connecting piece 197 of the supporting frame 182, or of the roller locking bar 276, and is articulately jointed by means of a screw 278 to the arm 279 of an angle lever 280. The angle lever 280 (Fig. 10) is pivotably mounted on a screw 281 screwed into the notched locking bar 276, and its arm 282 is articulately jointed by means of a rivet 283 to a slide 284 which, on its part is guided by means of a screw 286 passing through a slot 285 and screwed into the front connecting piece 197 of the supporting frame 182. The slide 284 is in contact at its left-hand end with a locking bar 287 (Figs. 8 and 10) which is displaceably mounted by means of screws 289 projecting through its slots 288 and fixed in the front connecting piece 197 of the supporting frame 182. A spring 292 lying in a recess 290 of the locking bar 287 and connected on the one hand to the left-hand of this recess and on the other hand to a spring-connecting screw 291 fixed in the front connecting bridge 197 of the supporting frame 182 presses the locking bar 287 constantly against the slide 284. The spring 292 is covered from the outside by means of a plate 294 screwed to the locking bar 287 by the two screws 293 and is protected

against damage. The locking bar 287 is capable of co-acting by means of its noses 295 with the calculating key levers 296 and by means of its nose 297 with the key lever 298 for column total taking.

A further lever 299 (Fig. 10) is swingably mounted on a screw 300 screwed into the roller locking bar 276, and is capable of co-acting by means of a locking nose 301 provided on its arm 302, with a bend 303 of an arm 304 of the key lever 273. The lever 299 with its arm 302 is constantly pressed against the bend 303 of the arm 304 of the key lever 273 by means of a spring 305 connected on the one hand to the arm 302 of the lever 299 and on the other hand to a fixing plate 203 attached in the supporting frame 182. An arm 306 of the lever 299 serves for the hand operation of the same.

Filling in of a sheet and registering the corresponding values simultaneously in the totalizers and cross totalizers.

In Figure 28 a table is illustrated which gives a survey with regard to the filling up of the sheet and to the setting of the column totalizers 1 to 8 (Fig. 29) for the kind of calculation of the cross totalizers 120 and 121 (Fig. 29).

After the kind of calculation of the cross totalizers 120 and 121 is set by means of the setting plate 307 (Figs. 1, 7, and 26) on the totalizers 1 to 8 (Fig. 29) the columns 1 to 9 of the sheet (Fig. 28) are first of all filled up whereby the corresponding values are simultaneously registered in the totalizers 1 to 6.

After the form is inserted, to commence with the name "O. Schmidt" (Fig. 28) is typed in the column indicated by "1" by striking the letter keys 34 (Figures 1, 7, 12, 25 and 26) whereby the paper carriage 10 is traversed stepwise to the left and the column of the sheet indicated by "2" has moved into the typing position. In the column "2", the number "15" is now entered by striking the corresponding number typing keys 310 (Figures 1, 2, 12, 17, 25 and 26).

After the number "15" has been typed and by utilizing the space key 311 (Figures 12 and 26) the paper carriage 10 has been brought into a position in which the column indicated by "3" is in the typing position. By means of the letter keys 34, the "month" column "3" is now filled in, whereby the paper carriage 10 was brought so that the column of the sheet indicated by "4" is in the typing position.

In order to facilitate the survey of the eight totalizers 1 to 8 necessary for filling up the sheet illustrated in Figure 29 and the type of shift of the cross totalizers 120 and 121 (Figures 1, 7 and 12) which the control plates 307 (Figures 1, 7 and 26) of the column totalizers 1 to 8 are set for the kind of calculation of the cross totalizers 120 and 121, a table is illustrated in Figure 28.

As already stated, the paper carriage 10 is located so that the column "4" of the sheet is in the typing field whereby the totalizer 1 is also in the working position. Moreover, the carriage 123 carrying both of the cross totalizers 120 and 121 has been taken so far to the left, by way of the coupling device 312, 313 (Figs. 12 and 26) by the column totalizer 1, that the corresponding decimal places of the same lie opposite to the driving wheels 314 (Figures 21, 24 and 26) and 315. On the column totalizer 1 moving into the working position, however, the bar 316 (Figure 18) fixed to the same has come into operation on the nose 317 of the lever 318, whereby the nose 319 of the lever 318 has released the lever 320

and further the remaining parts in connection with the lever 318 have also taken up the position according to Figure 18, so that the lever 321 of the shaft 322 and the hook 323 of the flap 324 are released by the lever 325, and can move freely. Now the calculating keys 23 corresponding to the amount of "RM 200" are depressed after one another, the key corresponding to the value "2" being struck first. It may be first remarked that in consequence of the positioning for addition of the change-over gear illustrated in Figure 22, by the setting plate 307 of the totalizer 1 this amount is added in the cross totalizer 120. Since however the sleeve 326 (Figures 24 and 26) is not displaced by the totalizer 1 from its position shown in Figure 24 the coupling halves 326, 327 are out of engagement to which the amount is not registered in the cross totalizer 121. On the depression of the calculating key lever corresponding to the value "2" the rearwardly directed limb on the calculating key lever 296 (Figs. 14 and 17) is swung round the shaft 237 in the clockwise direction, whereby the associated U-shaped stop member 329 the downwardly directed limb 330 of which contacts on a face 331 of the calculating key lever 296 is swung in the anti-clockwise direction round its shaft 322. The contact pin 332 (Fig. 17) provided on the stop piece 329 thereby moves into the path of movement of the arm 333 of the feeler finger 334 (Figs. 7, 12, 13, 17, 25 and 26) corresponding to the value "2". Further, on the further depression of the calculating key 23, the pawl 335 (Figures 14, 16 and 17) arranged on the key lever 296 acts on the right-angled upwardly bent nose 336 of the flap 324 mounted on the pins 337 (Figures 14, 15 and 16) and carried by arms 344, 345 and swings this in the clockwise direction against the action of the spring 338. Moreover, the edge 339 of the lug 340 (Figure 14) of the flap 324 slides from the edge 341 (Fig. 14) of the bearing member 342 which is formed as a stop 343, whereby the levers 344, 345 (Figs. 15 and 16) and 346 rigidly mounted on the shaft 347, and further the three-armed lever 348 mounted on the shaft 237 and in engagement with the lever 346 by means of the pin-slot connection 349, 450 can follow the pull of the spring 351.

On the depression of the key lever 296, however, the nose 352 (Figs. 14, 16 and 17) of the pawl 335 has simultaneously fallen behind the nose 336 of the flap 324, so that the pawl 335 on the swinging of the parts 344, 324 and 345 in the anti-clockwise direction is swung by the nose 336 in the clockwise direction. The locking bar 353 swingably arranged on the shaft 347 which at its ends, on account of the pull of the spring 354, lies against the pins 355 and 356 respectively, likewise participates in the movement through the release of the bar 324 by the stop 343, and is swung in the anti-clockwise direction. By the movement of the locking bar 353 the upwardly directed right angled bent bridge 357 slides over a nose 358 (Figures 14, 16 and 17) of the depressed key lever 296, and locks the same in the depressed position. Further, a part 359 (Figs. 14 and 16) fixed to the locking bar 353 participates in the swinging movement and slides along on the under edge of a two-armed lever 360 (Figures 7, 14 and 16) swingably mounted on the shaft 237 and in consequence of the pull of the spring 361 attached to the lever 360 is held in the recess 362 until after a revolution of the coupling consisting of the cams 242, 364, 365, the lever 360, the part 359, as

well as the locking bar 353, are released again. A depressed calculating key lever 296, therefore, is not released again, owing to the locking means 359 and 362, until the corresponding value has been transferred. As already explained on striking the calculating key 23 corresponding to the value "2", the system of levers 344, 345 and 346 attached to the shaft 347 as well as the three-armed lever 348 swingably mounted on the shaft 237 have been released, whereby the latter lever under the pull of its spring 351 has been swung in the direction of the arrow 363 (Figures 7, 14, and 16). The nose 348a of the upwardly directed arm 377 of the lever 348 moves out of reach of the nose 366 of the pawl 367. The downwardly directed arm 368, on the other hand, has moved into the path of movement of the cam 365. Since the pawl 367 is displaceable in relation to the cam 365 by means of the pin-slot connection 369, 379, 371, 372 and of the compression spring 373, and was locked by the nose 348a of the lever 348, the pawl 367 will follow in the arrow direction 374 under the pressure of the spring 373 on swinging out of the lever nose 348a, whereby the tooth 375 of the pawl 367 moves into engagement with the toothed wheel 376 continually rotated by way of the parts 243 (Fig. 12) 378, 379, 380 (Figs. 7 and 12) and 381, 382, 383 (Fig. 12), whereby all three cams 242, 364 and 365 are coupled with the same, so that they participate in the rotational movement of the same and in the arrow direction 384 (Figures 7, 14 and 16).

In the rotation of the three cams 242, 364, 365 after the nose 366 of the pawl 367 has just moved past the nose 348a of the three-armed lever 348, the cam 365 first acts on the arm 368 of the three armed lever 348 lying in the path of movement, and brings the upper arm 377 of the lever 348 in the anti-clockwise direction into the path of movement of the nose 366 of the pawl 367, and acts on the pawl 367 in the raising sense. By the return of the lever 348, the tension spring 351 is again tensioned and the coupling flap 324 mounted on the levers 344 and 345 is returned by the arm 346 connected to the lever 348 and by the resulting swinging movement of the shaft 347 in the clockwise direction, whereby the nose 340 of the flap 324 moves behind the bend 343 of the stationary support 342 by means of the pull of the spring 338. The end 352 of the pawl 335 swingably mounted on the key lever 296, moreover, under the action of its spring 386 follows the movement of the flap 324 and rests behind the nose 336 of the flap 324, since at this moment the key lever 296 concerned, is still depressed and is held by the locking bar 353 and also by the part 359 through the lever nose 362. Although the locking bar 353 is held swung in its position in the anti-clockwise direction, the parts 344, 324 and 345 in consequence of the resilient connection of the springs 354 were still capable of swinging in the clockwise direction.

On the further rotation of the three cams 242, 364, 365 the roller lever 387, 388 (Figs. 7, 14 and 17) which by means of the pull of the spring 389 is held in contact with the cam 242 (Figure 14) first follows the depression of the same, whereby the draw bar 390 jointed to the roller lever 387, 388 following its spring 389 is drawn in the direction of the arrow 391. The part 392 swingably mounted on the draw bar 390 (Fig. 17) by means of the screw 393 is thereby moved downwards along with the draw bar 390. The pin

394 fixed to the part 392 which passes through the slot 395 of the lever 396 takes the latter and the shaft 397 along with it in the clockwise direction. The angle lever 398 (Figs. 13 and 17) which, on the one hand, is joined to the lever 396 through an angle member 399 is likewise, through the movement of the draw bar 390, swung round its point 400 in the anti-clockwise direction. Consequently the downwardly going arm of the lever 398 displaces the toothed wheel 401 nonrotatably mounted on the shaft 402 in the arrow direction 403 by means of its grooved connection 404 and 405, whereby the teeth of the same are coupled with the teeth 406 of the calculating sector 407. The pins 408 (Fig. 13) arranged on the toothed wheel 401, which are continually guided in the grooves of the claw 409 rigidly mounted on the shaft 402, ensure that the teeth of the toothed wheel 401 slide securely into the teeth 406 of the calculating sector 407 (Figure 17). As already mentioned, the shaft 397 is rotated in the clockwise direction by the lever 396, whereby the finger shaped lever 410 rigidly mounted on the shaft 397 is swung and the locking lever 411 partially illustrated in Figure 17 (see also Figure 27) unlocks the corresponding decimal place of the totalizer 1 located in the working position.

Further, on the one hand, the adjusting tooth 412 (Fig. 17) which is rigidly mounted on the shaft 397 releases the toothed wheel 414 and the shaft 415 connected with it and, on the other hand, the adjusting tooth 416 likewise rigidly mounted on the shaft 397 releases the toothed wheel 417 and the shaft 402 connected with it.

Further, the arm 418 mounted on the shaft 397 (Figure 19) thereby acts by way of its spring 419 (Figure 20) on the aligning tooth 420. This is now in engagement with some of the next higher decimal places lying adjacent to the decimal place located in the working position in relation to the main driving wheel 421 (Figure 17) of the column totalizer. Consequently, the aligning tooth 420 (Figure 20) is moved in the direction of the arrow 391, whereby the driving wheel or driving wheels of the higher decimal places, which are not in the working position, are released so that these wheels 421 in the event of tens transfer ensuing can freely rotate.

The locking lever 422 (Figs. 13 and 17) pinned to the shaft 397, swings in the clockwise direction and releases the nose 423 of the lever 424 jointed to the lever 425 by means of a screw 426.

By the swinging movement of the shaft 397 (Figure 23) in the clockwise direction, the levers 427 and 428 are also swung in the clockwise direction, whereby the part 429 is swung together with the shaft 430 and the two locking teeth 431 and 432 in the anti-clockwise direction. Accordingly, these two locking teeth also release the driving wheels 314 and 315 (Fig. 26) of the cross totalizers 120 and 121. Moreover the release fingers 433 and 434 (Fig. 23) attached to the shaft 430 are also swung with this shaft in the anti-clockwise direction, whereby the locking lever of the corresponding decimal places of the cross totalizer 120 and 121 are released. Since, as stated, the locking levers 431 and 432 mounted on the shaft 430 are also swung in the anti-clockwise direction, so they take along with them by means of their associated springs 435 (in Figure 21 only one is illustrated) the aligning teeth 436 and 437, whereby in a similar manner as by the aligning tooth 420 (Figure 19) the driving wheels of the cross totalizers 120 and 121

are released for possible tens transfer occurring.

After these movements have taken place the cam 365 (Fig. 14), meanwhile, on further rotation has moved so that its lower curved part has arrived in the vicinity of the roller lever 438, 439 (Figs. 14 and 17) whereby the same following the pull (Figures 13 and 17) of the spring 440 engaging with the slide 441 and the correspondingly formed cam 365 is swung round its shaft 322 and accordingly the slide 441 jointed by means of the screw 442 (Figure 14) is drawn in the direction of the arrow 391. By the downward movement of the slide 441 the slot 444 (Figure 17) acts on the roller 445 (Figures 13, 17 and 25) arranged on the calculating sector 407, 406 and projecting through the slot 444, and swings the sector 407, 406 in the direction of the arrow 447. Since the latter is rigidly connected to the shaft 448 by means of the clamping device 449, this shaft participates in the rotational movement in the direction of the arrow 447. The feeler fingers 334 rigidly mounted on the shaft 448 and designed for the values "0" to "9" are thereby swung together in the anti-clockwise direction and so far until the feeler finger 334 corresponding to the value "2" strikes on the pin 332 of the stop piece 329, which has been swung upwards by depression of the calculating key 23, corresponding to the value "2". The stroke of the feeler finger 334 is thereby transmitted to the calculating sector 407, 406 and accordingly the toothed wheel 401 (Figures 17 and 25) which is in engagement with the sector 407, 406 is rotated through two units, whereby the value is transmitted by way of the shaft 402 and the change-over gear 450 (Figure 17) 451 which was previously set for addition, through the knob 452 (Figure 12) and the shaft 415 to the main driving wheel 414 which, on its part, registers the value "2" in the corresponding totalizer decimal place of the column totalizer 1.

Moreover, the rotational movement of the shaft 402 (Figure 17) is transmitted by way of the change-over gear illustrated in Figure 22 to the shaft 453 on which the sleeve 326 (Figures 24 and 26) is fixed which, as hereinbefore described, is coupled only with the main driving wheel 314 for the cross totalizer 120, whereby the value "2" is registered only in this cross totalizer 120.

By the contact of the feeler finger 334 (Fig. 17) corresponding to the value "2" with the stop member 332 the slide 441 together with the roller lever 438, 439 was prevented from further downward movement, and since the formation of the cam 365 (Figure 14) is adapted for the greatest stroke, namely for the stroke of the feeler finger 334 corresponding to the value "10", so the roller lever 438, 439 remains for a short time freely suspended, and on the further rotation of the cam 365 is engaged and brought back. Before, however, the return of the roller lever 438, 439 and the slide 441 connected with it occurs, the arms 454 and 455 (Figures 13 and 17) rigidly mounted on the ends of the shaft 448 participate in the swinging movement of the feeler fingers 334 (or of the calculating sector 407, 406) and of the shaft 448. Accordingly the frame 456, 457 and 458 (Figs. 13 and 17) jointed at the points 459 and 460 and guided on the slide bars 461, 462 by means of screws 463 and 464 will slide forwards through an amount corresponding to the value "2". The lower edge 465 of the front bridge 57 thereby reaches a position over the nose 466 (Figure 25) of the number key lever 472 corresponding to the value "2".

Shortly thereafter, the roller lever 467, 468 rigidly connected with the shaft 322 (Figures 13, 14 and 17) falls into the depression of the cam 364, whereby the arms 461 and 462 rigidly connected to the shaft 322 are swung in the clockwise direction by the springs 469 engaging with their short arms 470 and 471, and with them also the frame 456, 457, 458 guided by them. This frame thereby strikes on the nose 466 (Figure 25) of the number typing key lever 472 corresponding to the value "2" and presses this lever downwards against the action of its spring 473 (Figure 7). The control tooth 474 of the draw hook 475 is moved by the coupling lever 476 into engagement with the cam shaft 45. This now draws the draw hook 475 forward which by way of the intermediate lever 477 causes the type lever 478 to strike on the platen 118, whereby during the striking movement the control tooth 474 moves out of engagement with the cam shaft 45. Through the striking movement of the type lever the paper carriage 10 has been moved by way of the parts 479 (Fig. 7) and 85 (Fig. 1) one step to the left under the pull of the carriage draw spring so that the next lower place of the column totalizer 1 is now opposite to the main driving wheel 414. (Fig. 17).

After the termination of the calculating operation and before the commencement of the paper carriage shift (in which the time for registration of the value "10" is to be taken into consideration) the raising of the roller lever 387, 388 (Fig. 14 and 17), which is loosely mounted upon the shaft 322, is effected by the elevated part of the cam 242 which is indicated by 481. The slide 390 (Fig. 17) is thereby raised in the opposite direction of the arrow 391. It thereby takes along with it the lever 392 by means of the screw 393, in the anti-clockwise direction, whereby by way of the parts 394, 482 and 493 the lever 396 is swung in the anti-clockwise direction. In consequence of this swinging movement of the lever 396, on the one hand, the shaft 397 is swung in the anti-clockwise direction and, on the other hand, the wheel 401 is brought out of engagement again (Figure 13) with the calculating segment 407 by means of the parts 399 and 398 (Figures 13 and 17). By the swinging movement of the shaft 397 in the anti-clockwise direction, the releasing finger 410 (Figure 17) has released the locking lever 411 (Fig. 27) again (in Figure 17 illustrated broken off) lying opposite to it, so that the calculating place of the totalizer 1 in which the value "2" was registered is again locked. By the swinging movement of the shaft 397 in the anti-clockwise direction, the lever 422 (Figure 17) has also been swung along with it and has swung the lever 424 against the action of its spring 484.

Further the arm 418 (Figure 19) has raised the aligning tooth 420 into its position illustrated in Figure 19, whereby the wheel 421 (Figure 20) possibly rotated by a tens transfer is aligned. This is advantageous for the reason that with wide totalizers, in consequence of unavoidable slight play in manufacture, the numbers visible in the inspection aperture are liable to be disposed in spiral fashion, whereby the numbers located in the higher places are occasionally not completely shown. This is avoided by the aligning tooth 420.

Further, by the swinging movement of the shaft 397 in the anti-clockwise direction (Fig. 23) the release fingers 434, 433 of the two cross totalizers 120 and 121 are swung by way of the 75

parts 427, 486, 487, 428, 429 and 430 in the clockwise direction, whereby the corresponding locking levers were also released and consequently the associated calculating places were locked. Further, the teeth 416 and 412 (Fig. 17) fixed on the shaft 397 and also the teeth 431 and 432 (Figs. 21 and 23) fixed on the shaft 430 have entered again into their wheels 417 and 414 and also 314 and 315, whereby the calculating mechanism also is again locked. Moreover, the aligning teeth 436 and 437 (Fig. 21) have been moved by the locking teeth 431 and 432 (Fig. 23) back into their wheels lying opposite to them, whereby the same object is attained as by the aligning tooth 420 (Fig. 19). As soon as these locking operations are completed, the carriage shift operation effected by the typing operation, as above described, follows.

After the locking operation is effected the roller lever 468, 467 (Figs. 14 and 17) rigidly mounted on the shaft 322 is raised by the rising edge 488 (Fig. 14) of the cam 364. The shaft 322 is thereby swung in the anti-clockwise direction. Accordingly, the arms 462 and 461 (Fig. 17) fixed on the shaft 322 are also swung in the anti-clockwise direction, whereby the frame 456, 457, 458 mounted on them is raised into its upper position. In consequence of this, the nose 466 (Figure 25) of the number key lever 472 corresponding to the value "2" is released. This now returns into its rest position under the action of its spring 473 (Fig. 7), whereby the coupling lever 476 mounted on the key lever 472 again engages over the nose 490 of its co-operating draw lever 475.

In the swinging movement of the shaft 322 (Figure 17) in the anti-clockwise direction the arm 425 has also raised the lever 424, whereby under the action of the spring 484, the nose 423 of this lever snaps over the nose 491 of the lever 422 already located in its rest position.

During the raising of the frame 456, 457, 458 (Fig. 17) the rising face 492 of the cam 365 (Figure 14) has come into operation on the roller lever 438, 439 which is loosely mounted on the shaft 322 and has brought this lever into its rest position. The slide 441 (Figs. 13 and 17) was thereby raised against the action of its spring 440, whereby the inclined slot 444 of the slide acts on the roller 445 of the calculating sector 407, which has meanwhile been released from the wheel 401, and swings this sector in the opposite direction to the arrow 447. In consequence of this, on the one hand, the shaft 448 rigidly connected to it is brought back together with the feeler fingers 334 into their rest position while, on the other hand, the number key striking frame 456, 457, 458 is returned to its rest position, illustrated in Figure 17, by way of the arms 454 and 455 jointed to it and rigidly mounted on the shaft 448 in which position the frame is held by the elevated part of the cam 365 (Figure 14).

Further during the return movement of the number key striking frame 456, 457, 458 into its rest position illustrated in Figure 17 the rising edge 481 (Figure 14) of the cam 242 has come into operation on the end 493 of the lever 360, whereby this lever is swung against the action of its spring 361. Consequently the nose 494 of the lever 360 releases the part 359 of the locking bar 353, whereby this bar under the action of its spring 354 (Figure 15) tensioned by the previous return of the flap 324 into its rest position likewise moves back into its rest position. Accordingly, the nose 358 (Figure 14) of the calculating

key lever 296 corresponding to the value "2" is released, which lever under the action of the spring 495 (Fig. 17) engaging with its associated stop member 329 (Fig. 17) now returns along with the stop member 329 into the rest position illustrated in Figure 17, whereby the pawl 335 mounted on the calculating key lever 296 also rests again over the edge 336 of the flap 324.

Finally, the nose 366 of the pawl 367 (Fig. 14) mounted on the coupling disc 365 pushes against the nose 364 of the three-armed lever 348 already located in its rest position, whereby the pawl 367 is brought out of engagement against the action of its spring 373, with the wheel 376 of the continually rotating shaft 243. In order to prevent the cam series 242, 364, 365 from springing back at the moment when the pawl 367 is raised out of engagement with the toothed wheel 376 the roller 240 of the roller lever 239 snaps into the depression 497 of the cam 242 under the action of its strong spring 247, whereby the cam series 242, 364, 365 and the pawl 367 being raised, are held in their position illustrated in Figure 14.

It would be too exhaustive a matter to repeat the process already described for the registration of the value "2" for the values to be registered in the totalizers 2 to 6, since the operations are exactly the same.

The following may be mentioned at this point briefly in addition.

The paper carriage or the totalizer 1 is now located with the decimal place following the value "2" in the column 4 (Figure 28) in the working position, in which a "0" is to be registered, i. e., in this case, therefore, no calculating operation is to take place, while the typing must be released.

To this end, the feeler finger 334 corresponding to the zero calculating key 296 (Figure 17) is fixed to the clamping jaw part 498 of the arm 454. On striking the zero calculating key 23 the same operations occur exactly as above described, only with the difference that in consequence of the contact of the finger 334 corresponding to the value "0" with its stop screw 322, no swinging of the calculating segment results. On the other hand, the bar 457 is moved downwards and strikes on the nose 466 (Fig. 25) of the number typing key corresponding to the value "0" and the associated type lever is caused to strike. Herewith a carriage step is again released so that now the units decimal place of the totalizer 1 (the place lying next the comma place) is located in the working position.

Here, the same operations take place since a "0" is to be dealt with, whereby the totalizer 1 moves so that its comma place is in the working position.

If, here, unintentionally a calculating key is struck, the coupling 242, 364, 365, 367 (Fig. 14) naturally makes a revolution and the bar 457 would be moved downwards by the cam 364 and the roller lever 467, 486 by way of the parts 322, 462, 461 and the number typing key corresponding to the value of the depressed key would be depressed, whereby the value printed would obviously be incorrect. In order to prevent this, the locking arrangement 423, 424, 425 is provided which does not permit swinging of the shaft 322 and with it a downward movement of the bar 457.

This locking action is obtained by arranging a fixed locking member 500 (Figure 27) in the common position. Accordingly, since this cannot swing out, the release finger 410 (Figure 17) lying

opposite to it cannot swing in the clockwise direction. On account of this the shaft 397 and the lever 422 remain substantially in their rest position and thus do not release the lever 424 since, owing to this, the lever 396 cannot swing out, so that the parts 399 and 398 connected to it remain at rest, so that the wheel 401 does not move into engagement with the calculating segment 407. This segment can thus swing out under the action of the spring 440 which engages with its operating part 441, whereby only an idle stroke of the same and of the bar 457 is caused. This, however, in consequence of the above mentioned effective position of the locking device 422, 424 cannot release any operation.

Nevertheless, if it is desired, a comma could be printed under these circumstances in the comma place. For this it is only necessary that the slots 501 and 502 (Fig. 17) in the arms 461 and 462 are formed of such length that the calculating segment 407 can swing through ten units so that in this case, therefore, the bar 457 could act on a projection 503 (Figure 25) of the comma typing key. At the same time, however, the locking device 422 (Figure 17) above described must be abandoned, since this device would prevent a swinging movement of the shaft 322 and therewith a downward movement of the bar 457. In spite of the swinging movement of the segment 407, however, no transmission of values takes place to the calculating mechanism since, as mentioned, the wheel 401 is not in engagement with the calculating segment 407. In the present case the typing of the comma is discarded and thence the lock 424, 422 is retained.

In order to pass from the comma place into the next lower decimal place the space key 311 (Figure 12) is struck, so that the totalizer 1 is now located with its tenth decimal place in the working position.

If the numerical example given in Figure 29 is now considered, it should be clear without further explanation that for the further columns, including the column 9, the same procedure is followed only with the difference that in the columns 5 to 7, inclusive, the cross totalizer 120 is changed over to subtraction by the corresponding column totalizers 2 to 4, while the sleeve 326 (Figures 26 and 24) remains in its left-hand position in which the cross totalizer 121 is therefore uncoupled.

In the columns 8 and 9 (Figure 28) the sleeve 326 is brought into its middle position by the totalizers 5 and 9 and positioned for addition so that the values shown in the columns 8 and 9, are added in both of the cross totalizers 120 and 121.

The amount "184.30" is then visible in the cross totalizer 120 and the amount "4.30" in the cross totalizer 121.

Automatic total-taking device

The writing out of the values 184.30 and 4.30 calculated and registered in the cross totalizers 120 and 121 (Fig. 30) and their transmission into the totalizers 7 and 8 follows automatically and in the manner hereinafter described in tabulating, i. e., on the entering of the totalizers into their calculating position.

Now the tabulator key 9₁₀₀ (Fig. 8) is depressed whereby in the manner as described under the heading "Tabulating Device" the tabulating process takes place. While in tabulating the totalizers 1 to 6 are brought into the calculating position by striking of a normal rider 13 (Fig. 30) on the

column selecting lever 14 (Fig. 7) which has been raised corresponding to the depressed tabulator key lever 15, the special rider 124 (Fig. 30) are arranged on the totalizers 7 and 8 for this purpose. In order to transmit the value "184.30" registered in the cross totalizer 121 to the column totalizer 7, the tabulator key 9 corresponding to the hundreds place of the denominational tabulator is depressed after the totalizer 6 has moved out of its units denomination, whereby the operations already described under the heading "Tabulating device" take place and the carriage 10 is released for a movement towards the left.

In the movement of the carriage 10 towards the left the nose 125 of the rider 124 slides over the arm 506 (Fig. 9) of the lever 126 and swings this, together with the lever 129 fastened to it (Figs. 7 and 9), round the screw 132 (Fig. 8) in the anti-clockwise direction. The lever 142 is thereby swung in the clockwise direction round its bearing pin 145 by way of the parts 134, 135, 136, 138 and 140. The lever 157 is thereby swung likewise in the clockwise direction round its bearing screw 156 by way of the parts 147, 148 and 161. The lever 157 can only swing out until its pin 169 contacts with the inclined face 507 of the arm 170 of the lever 171 (Fig. 7). On the further movement of the lever 142 the lever 148 with its slot 163 is then displaced on the screw 158 whereby the spring 161 is tensioned. Since the lever 59, as described under the heading "Tabulating device", swings in the anti-clockwise direction round the bearing screw 166, and the lever 157 was thereby raised in the opposite direction to that of the arrow 391, the pin 169 of the lever 157, on the raising of the latter, slides off the inclined face 507 of the lever 171 in order after leaving the same to swing with the lever 157 in the clockwise direction round the bearing screw 156 under the action of the tensioned spring 161. The lever 157 thereby moves with its pin 169 into the working position in relation to the inclined face 508 of the arm 170 of the lever 171.

What has been previously said holds good only in tabulating with short carriage paths, since it is then only correct that the parts 126, 129, 142, 148, 157 (Fig. 9) are influenced by the tabulator rider 124 before the lever 157 is raised by the swinging of the lever 59, while with long carriage paths in tabulating the lever 59 has already swung out and the lever 157 is thereby raised before the previously mentioned parts are influenced by the tabulator rider 124, so that the lever 157 with its pin 169 can thereby move unhindered into the operative position in relation to the inclined face 508 of the arm 170 of the lever 171.

If now the lever 59 is swung back, in the clockwise direction round its support 166 into its initial position which takes place after the termination of the carriage movement to the left, through the impact of the rider 124 on the corresponding raised column selecting lever 14 (Fig. 7), the lever 157 is influenced in the direction of the arrow 391.

The pin 169 thereby presses on the inclined face 508 of the arm 170 of the angle lever 171 and swings this in the clockwise direction round its bearing screw 173, whereby the arm 175 acts on the pin 176 of the lever 180 (Fig. 9) and swings the latter with its supporting shaft 177 and the lever 185 likewise fixed to this, in the anti-clockwise direction. The link 189 articulately joined to the lever 185 is thereby displaced in the arrow direction 205 (Figs. 7 and 9), whereby the key lever 195 for the cross totalizer total taking is swung in the clockwise direction round

its shaft 237 by means of the pin slot connection 193, 191. The T. C. key 509 (Figs. 7 and 8) is thereby automatically depressed and the total taking from the cross totalizer 120 thereby initiated, whereby during the total taking from the said totalizer the T. C. key 509 is automatically held depressed.

On the depression of the total taking key 509 for the cross totalizer the face 510 (Fig. 9) of the lever 195 acts on the nose 336 (Fig. 16) of the flap 324 and swings this in the clockwise direction against the action of the spring 338 (Fig. 14). The lug 340 (Fig. 14) of the flap 324 thereby slides off the edge 341 of the bearing 342 which is formed as a stop 343, whereby the levers 344, 345, 346, 348 rigidly mounted on the shaft 347 follow the pull of the spring 351 engaging with the three-armed lever 348.

Through the resulting swinging out of the lever 348 (Fig. 14) in the clockwise direction is closed the coupling 367 and 376, whereby the cams 365, 364, 242 participate in the rotation of the shaft 243 in the arrow direction 384. The depressed key 509 for total taking T. C. of the cross totalizers is hereby held automatically so long in the depressed position until the cross totalizer 120 is cleared whereby the coupling 367, 376 for the cams 365, 364, 242 also remains closed for this period.

When, consequently, the shaft 243 (Fig. 14) and therewith the cam elements 365, 364, 242 are rotated in the arrow direction 384, the cam 365 acts first on the arm 368 of the lever 348 and swings this in the opposite direction to the arrow 363 against the action of its spring 351, whereby the parts 346, 347, 344, 345 and 324 swing in the clockwise direction, while the locking flap 353 at this point is still held in its out-swung position in the anti-clockwise direction by the lock 359, 362.

On the swinging of the flap 324 in the clockwise direction its nose 336, however, slides along on the face 510 (Fig. 21) of the T. C. key lever 195, whereby the lug 340 (Fig. 14) of the flap 324 cannot be gripped by the lug 343 of the support 342. Consequently the parts 346, 344, 345, 324 (Fig. 16) are not stopped at the end of their swinging movement in the clockwise direction, but in the further rotation of the cam 365 follow the action of the tensioned springs 351 and 354 so that the lever 348 is therefore swung in the arrow direction 363 again and the parts 346, 344, 345, 324 swing again in the anti-clockwise direction, whereby the tension of the springs 351 and 354 is decreased.

If now shortly before the completion of the first revolution of the cam element, that is, shortly before the completion of the calculating process in the hundreds denomination the lever 360 (Fig. 14) swings round the shaft 237 against the action of the spring 361, by the co-operation of its arm 493 with the curved projection 481 of the cam disc 242, the lock 362, 359 is released. Since, however, at this moment the parts 346, 347, 344, 345, 324 have been swung so far in the anti-clockwise direction under the action of the spring 351 engaging with the lever 348 that the pins 355 and 356 lie on the locking flap 353 held up to this point by the lever 360 in the locking position so these parts are held by their pins 355 and 356 until the lever 360 snaps with its nose 494 again behind the lug 359. Since according to the foregoing the parts 348, 346, 344, 347, 345, 324 have been brought again by means of the spring 351 into the working position, the nose

348a of the arm 377 of the lever 348 has moved again out of the working position in relation to the nose 366 of the coupling pawl 367, whereby the cam element after the resulting revolution is not uncoupled but a further revolution of the same and consequently a new calculating process begins, previous to which, a carriage step has taken place so that the totalizer 120 is then located with its tens denomination in the calculating position.

This working process is repeated in each denomination of the cross totalizer 120 so that the T. C. key, therefore, according to the foregoing, is automatically held depressed until the cross totalizer 120 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 195 (Fig. 21) acts, further, on depression with its face 512 on the face 513 of the slide 514 so that the same travels upwards in the opposite direction of the arrow 391 against the action of its spring. It thereby acts with its pin 516 on the incline 517 of the slot 518 of the slide 519, whereby this is displaced to the left (seen in Fig. 21).

If now it should be inadvertently omitted to shift the cross totalizer 120 for subtraction while the pre-setting plate 307 (Fig. 12) of the column totalizer concerned in this case 7, has not been set, this is not disadvantageous since when the slide 519 (Fig. 21) travels to the left, the same acts on the pin 521 fixed to the lever 520 and rotates the lever 520, the shaft 522, and the levers 523 and 524, in the anti-clockwise direction, so that the driving wheel 314 is changed over by means of the change-over gear 525, 526, 527, shaft 453, sleeve 326 (Figs. 24 and 26) and coupling halves of 528, 529 automatically for subtractive operation.

On the travel of the slide 519 (Fig. 21) to the left the nose 530 of the part 531 of the slide 519 is laid in front of the face 532 of the aligning tooth 436 of the cross totalizer 120, and the nose of the part 533 of the slide 519 in front of the face 535 of the tooth 437 of the cross totalizer 121 so that the aligning teeth with their teeth 537 and 538 are held in engagement with the four toothed wheels 360 (Fig. 7) of the cross totalizer 120 and 121 lying to the left of the driving wheel 314 or 315 and lock these wheels. The wheels 360 of the cross totalizers 120 and 121 thereby correspond to the wheels 421 (Fig. 25) of the column totalizer.

Further in the upward movement of the slide 514, (Fig. 21) the part 540 has been carried upward along with it. This hereby releases the pin 541 of the lever 542, so that this follows, under the action of its spring 543, the part 540 in its movement. Moreover, the coupling lever 544 jointed to the lever 542 moves so that its nose 545 lies over the nose 546 of the draw lever 547.

In the rotation of the three cams 242 (Figure 14), 364 and 365 the roller lever 387, 388 first slides under the action of the spring 389 engaging with the draw bar 390 from the elevated part 578 of the cam 242 on the lower part of the same, whereby the draw bar 390 moves in the direction of the arrow 391. Hereby, the toothed wheel 401 (Fig. 17) is brought into engagement with the teeth 406 of the calculating sector 407 by way of the parts 392 (Figure 17), 394, 396, 399, 398, 404 and 405. Further, on the displacement of the draw bar 390 in the direction of the arrow 391

the shaft 397, and the parts 422, 416, 412, 320 (Figure 17) 418 (Figure 19) 410, 385 (Figure 23) and 427 rigidly connected to it are swung by way of the parts 392, 394, 396 in the clockwise direction (seen in Fig. 17) whereby by means of the release finger 410, the locking lever 548 (Figure 27) lying opposite to it, is raised and accordingly the calculating place located in the working position of the column totalizer 7, is unlocked.

In the swinging movement of the shaft 397 in the clockwise direction (Fig. 23) the lever 427 fixed to it, is likewise swung in the same direction. In virtue of this, the lever 427 acts, by means of its nose 486, on the lever 487, whereby the latter is swung in the clockwise direction. The lever 429 which is in articulated connection with the lever 487, is hereby swung in the anti-clockwise direction against the action of its spring 550 in which swinging movement the shaft 430 and the levers 431 and 432, as well as the release fingers 434 and 433 participate, whereby the driving wheels 314 and 315 (Fig. 24) are unlocked, and the toothed wheels located in the cross totalizers 120 and 121 are released. Since the coupling half 327 (Fig. 24) is not in engagement with the coupling half 551 and therefore the driving wheel 315 is not acted upon, so the release of the driving wheel 315 by the pawl 432 is unimportant.

In the further rotation of the three cams 242 (Fig. 14) 364, 365 the roller 439, rotatably mounted on the lever 438 moves from the elevated part of the cam 365, on to the lower part of the same. In virtue of this, the draw bar 441 (Fig. 17) is displaced in the direction of the arrow 391 under the action of its spring 440. The incline 552, of the slot 444 of the rod 441, hereby acts on the roller 445 of the calculating sector 407, whereby this is swung in the anti-clockwise direction. Since the teeth 406 of the calculating sector 407 are in engagement with the toothed wheel 401, so the driving wheel 314 (Fig. 24) of the cross totalizer 120 is rotated in the subtractive direction, by way of the parts 402, 525 (Fig. 22) 526, 527, 453 (Fig. 24) 326, 528 and 529 and until the number roller of the hundred place of the cross totalizer 120, 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 360 (Figure 7) of the next higher decimal place (thousands place) is held fast by the aligning tooth 436 which is locked by the nose 530 (Figure 21) of the slide 519. The calculating segment 407 (Figure 17) will be able, therefore, only to rotate through one unit. Accordingly, the driving wheel 414 is also rotated, by way of the parts 402, 450, 451, 415 likewise only through one unit, whereby in the hundreds decimal place of the column totalizer 7, a "1" is registered.

By the swinging out movement of the calculating segment 407 (Fig. 17) through one unit, the lower arm 454 of this segment moves the number key striking yoke 458, 457, 456 forward through one unit, whereby the number typing key lever 472 corresponding to the value "1" is moved downward, and the "1" is impressed by the cam 364 (Figure 14) by way of the roller lever 467, 468, as described under the heading "Filling in a sheet and registering the corresponding values simultaneously in the totalizers and cross totalizers", whereby the paper carriage 10 moves one step to the left. Before, however, the carriage shift takes place, the slide 390 (Figure 17) has moved upwards again and has effected the various locking operations again.

As soon as the paper carriage 10 has moved so

that the tens decimal place of the column totalizer 7 and of the cross totalizer 120 have arrived in the working position, the operations since the key 509 (Figure 21) is held depressed—are repeated, whereby the number roller of the cross totalizer 120, showing an "8" is moved to zero while in the tens decimal place of the cross totalizer 7, an "8" appears, whereby after the number "8" has been typed, the paper carriage 10 again moves one step to the left.

Consequently, the units decimal place of the column totalizer 7 and of the cross totalizer 120 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 10 is moved one step to the left by means of the space key, whereby the tenths decimal place of the column totalizer 7 and of the cross totalizer 120, has arrived in the working position.

Now, the same operations are repeated in the tenths decimal place of the column totalizer 7 and of the cross totalizer 120 as the key 509 is still held depressed—whereby the tenths decimal place of the cross totalizer 120 moves to zero, and in the tenths decimal place of the column totalizer 7 a "3" is visible.

When the column totalizer 7 and the cross totalizer 120 are now moved so that their hundredths decimal are in the working position and the "zero" is typed on the paper, a further carriage step follows.

Accordingly the column totalizer 7 now stands in such a position that the nose 317 (Fig. 18) of the lever 318 lies in the gap 555 formed by the bars 316 of the two column totalizers 7 and 8. The lever 556 could therefore, in consequence of the pull of the spring 557 on the link 558, swing out in the clockwise direction and the link 558 could move downwards. The pin 559 of the link 561 thereby presses on the member 560, whereby the link 561 is also moved downwards. The lever 325 is thereby swung in the anti-clockwise direction, whereby the lug 562 of the lever 525 is laid in front of the nose 563 of the lever 321 and accordingly a rocking movement of the lever 321 and of the shaft 322 in the clockwise direction is not possible. In consequence of this the arms 461 and 462 fixed on the shaft 322 (Fig. 17) cannot be swung. A downward movement of the figure key striking bar 457 cannot therefore take place. In this case, therefore, the lock 422, 424 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 316 (Fig. 18) take up the position according to Fig. 18 in which a locking of the lever 321 is not effected.

By the swinging of the lever 325 (Fig. 18) in the clockwise direction round the screw 564 the nose 565 of the lever 325 moves into the working position in relation to the bend 566 of the flap 324.

If now in the rotation of the cam element the lever 348 (Fig. 14) is swung in the opposite direction to that of the arrow 363 round the shaft 237 by the cam 365, whereby the parts 346, 344, 347, 345 swing in the clockwise direction so that at the end of this movement the nose 555 (Fig. 18) of the lever 325 is laid against the bend 566 of the flap 324 and holds this stationary together with the parts 345, 344, 347, 346 in this position. The nose 348a of the lever 348 (Fig. 14) thereby stands in the working position in relation to the stop 366 of the coupling pawl 367. When shortly

before the termination of the revolution of the cam element the cam 242 acts on the lever 360 and swings this against the action of the spring 361, the stop angle 359 of the locking flap 353 is released so that the latter under the action of the springs 354 which have been tensioned by the swinging of the parts 346, 344, 347, 345 is swung back in the clockwise direction on the shaft 347. In virtue of this the nose 358 (Fig. 21) of the lever 195 is released from the bend 357 of the flap 353 so that the T. C. key lever 195 can return into its rest position under the influence of the spring 515 (Fig. 21). Consequently, the flap 324 also returns into its initial position under the action of the spring 338 (Fig. 14), whereby the lug 340 of the flap 324 can be again laid against the lug 343 of the support 342, since the face 510 of the T. C. key lever 195, which in the meantime has been raised, does not prevent this any longer. At the end of the revolution of the cam element 242, 364, 365, the stop 366 of the coupling pawl 367 is held by the nose 348a of the lever 348 whereby the coupling 367, 376 (Fig. 14) is raised and consequently the rotation of the cam element 242, 364, 365 is interrupted.

Consequently a totalizer on the machine is therefore at times automatically written empty at one operation whereby the T. C. key 509 during the empty writing is automatically held depressed and after the completion of the total taking is again automatically released.

By the release of the key 509 (Fig. 21) the slide 514 is returned under the action of its spring 515, in the direction of the arrow 391 into its rest position again, whereby the part 540 rigidly mounted on it acts on the pin 541 of the lever 542 and swings the same round the shaft 571 in the clockwise direction against the action of its spring 543. The driving lever 544 which is arranged on the key lever 542 and which on the depression of the key 509 has snapped over the nose 546 of the draw lever 547 takes the draw lever 547 along with it, and swings it in the clockwise direction against the action of its spring 572, whereby the pawl 573 engages with the continually rotating cam-shaft 45. The draw lever 547 is thereby carried along and thus swings the intermediate lever 574 in the clockwise direction round its pivot 575.

Consequently the type lever 576 is also swung round its pivot 577, 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 21.

By the rotation of the shaft 243 (Figs. 7 and 14) and with it that of the cam 242 in the arrow direction 384 occurring in each denomination of the totalizer the lever 236 (Fig. 7) slides with its roller 240 first along the curved part 578 (Fig. 14) in order that on the further rotation of the cam 242 it can follow the curved part 579 (Fig. 7) under the influence of the spring 247. The lever 236 on the shaft 237 is swung thereby somewhat in the clockwise direction, and the lever 226 (Fig. 9) with the shaft 211 and the lever 212 are similarly swung by way of the parts 234 (Fig. 7), 231, 232. The link 216 also follows this movement and thereby slides with its slot 221 on the screw 222 in the opposite direction to the arrow 580.

This movement has no further influence on the mechanism but is occasioned solely by the form of the cam 242.

On running on to the last curved part 581

(Fig. 14), however, the lever 236 is swung in the anti-clockwise direction. The angle lever 226 (Fig. 9) and with it also the shaft 211 and the lever 212 are acted upon in the same direction by way of the parts 234, 231, 232 (Fig. 7), whereby the link 216 (Figs. 7 and 9) is moved under the action of its slot guide 221, 222 in the same direction as that of the arrow 580. Accordingly, the pin 225 of the link 216 acts on the lever 157 and swings this in the slot guide 163, 162 in the anti-clockwise direction round its bearing screw 156. The pin 169 of the lever 157 thereby moves out of the working position in relation to the inclined face 508 of the lever 171.

The arm 248 (Fig. 9) of the angle lever 226 in its swinging movement in the anti-clockwise direction acts also on the link 250 and displaces this and also the link 254 by way of the spring connection 259 in the opposite direction to the arrow 391 in which movement both links are guided by the slots 251 and 262. The upper end 261 formed as a shift pawl, of the link 254 thereby experiences a movement in the arrow direction 582 (Fig. 9) under the action of the spring 267 and the curved slide surface 268 of the guide slot 262, whereby the shift-nose-formed end 261 moves into the working position in relation to the shift wheel 265 (Fig. 9) and acts upon this and the shaft 264 in the anti-clockwise direction. Since now the shaft 264 (Fig. 7) represents the shift wheel shaft on which the carriage shift wheel 583 is fixed, the paper carriage 10 thus obtains a movement to the left by way of the carriage rack 584 (Fig. 7).

This additional positive movement has for its purpose to ensure that especially in long carriage machines in which the pull of the spring is too sluggish in consequence of the unavoidable great differences of tension due to the long carriage paths, the paper carriage with the corresponding denomination of the totalizer is brought timely and certainly into the calculating position.

The cam 242 (Fig. 14) is so arranged that the operation occasioned by the curved projection 581 of the foregoing described arrangement comes into operation at the end of a calculating process and after a typed impression has taken place and thereby released the carriage step. The movement represents, therefore, an addition to the carriage shift for bringing carriage 10 into the next calculating position.

Since the carriage step is limited by the loose shift tooth 86 which engages in the carriage shift wheel 88 (Fig. 6) the form of the cam 242 (Fig. 14) must be formed with extreme accuracy in order that it may accurately correspond to the travel determined by the loose shift tooth and in order to avoid substantial jamming which would otherwise arise. By the arrangement of the springs 259 (Fig. 9) which come into action in the event of jamming occasioned for example by the inaccuracy of the cam 242, the manufacture of the curve, on the accuracy of which it does not matter now so much, as well as the mounting of the mechanism, are simply and cheaply constructed and a reliable working of the same is ensured.

After a calculating process is finished the roller 240 (Fig. 14) slides off the curve projection 581 and is drawn together with the lever 236 so that it contacts with the curved part 578 by the spring 247, whereby the lever 236 is moved back in the clockwise direction round the shaft 237 into its rest position. To this movement follows by way of the parts 234, 231, 232 (Fig. 9) that of the angle

lever 226 also in the same direction into its rest position, whereby the slide 250 and the parts 259 and 254 connected with it are drawn back into their rest position under the action of the spring 271 (Figs. 7 and 9).

In total taking, a totalizer is written empty denominationalwise at one operation. In each denomination the parts 242, 236 (Fig. 14), 231, 226, 211, 212, 216, 225, 250, 254 (Fig. 9), are operated and also moved back again into their rest position. The additional carriage movement for the purpose of accelerating the carriage, therefore, likewise takes place automatically in each denomination of the totalizer.

The lever 59 (Figs. 3 and 9) is returned in the manner as described into its initial position after the carriage shift is completed by striking of the rider 124 on the raised column selecting lever 14 corresponding to the value to be calculated. The lever 157 (Fig. 9) and the link 148 were displaced in this movement in the arrow direction 391.

After the cross totalizer 120 is written empty, the carriage shift interrupted and the arm 506 (Fig. 9) of the lever 126 released by the nose 125 (Fig. 7) of the rider 124, the parts 126, 129, 135, 138, 142, 148 and 157 (Fig. 9) can return into their rest position under the action of the spring 161 which in the meanwhile has been tensioned by contact of the pin 169 of the lever 157 with the front edge 507 of the lever 171.

If now the value has been written out of the units place of the totalizer 120 the T. C. key is automatically released likewise. It could thereby happen that the lever 171 (Fig. 9) might move back while the lever 157 with its pin 169 is still within the range of the arm 170 of the lever 171 so that the lever 171, so far as the lever 59 has already returned into its rest position, cannot swing back and the T. C. key 509, therefore, cannot return also into its rest position, i. e., the total taking is not interrupted.

If, however, the lever 59 (Fig. 9) at the end of the revolution of the cam 242 (Fig. 14) moves back into its initial position, the T. C. key 509 is actuated again unnecessarily. In order to avoid this, the rod 216 (Fig. 9) is arranged which at the end of every calculating process is operated and thereby brings the lever 157 out of the working position in relation to the lever 171.

In order now to write out the value "4.30" from the cross totalizer 121 and transmit it to the totalizer 8, the tabulator key 9 of the units place of the denomination tabulator is depressed after which the same mechanisms are actuated as when writing empty the cross totalizer 120.

In order to prevent the key 586 (Fig. 19) from being operated for column totalizer total taking during the operation of the above described mechanism the locking bar 287 (Fig. 10) is arranged which lies in the rest position under the influence of the spring 292, with its nose 297 in the range of the key lever 298 and thereby does not permit the depression of the column totalizer total taking key 586.

If now the total is to be taken from the column totalizers 7 and 8 the key T. V. Prep. 602 (Figs. 8 and 10) is first of all depressed, whereby the key lever 273 (Figs. 7 and 10) is displaced in the arrow direction 391 and the angle lever 280 articulately jointed to it is swung in the clockwise direction round its bearing screw 281, so that the slide 284 is displaced in the arrow direction 582 which displacement again is transmitted in the same direction to the locking slide 287 and thereby displaces the locking slide 287

in the arrow direction 582 against the action of the spring 292. The noses 295 thereby come within the range of the calculating key levers 296 and of the space key lever 585, so that neither the calculating keys nor the space key can be depressed, while the nose 297 releases the key lever 298 for column totalizer total taking.

On the operation of the T. V. Prep. key 602 (Fig. 10) the key lever 273 with its bend 303 acts on the lever 299 in the clockwise direction round the bearing screw 300 and against the action of the spring 305, so that at the end of its displacement it may be held in this position by the nose 301 moving over the bend 303 of the key lever 273 under the influence of the spring 305.

The machine is therefore now prepared for total taking from the column totalizer 7. If now the paper carriage 10 with the totalizer 7 is brought into calculating position by operating the tabulator key 9 of the denominational tabulator corresponding to the value registered in the totalizer 7, the mechanism described previously for the automatic operation of the cross totalizer total taking key T. C. would be acted upon by the special tabulator rider 124 associated with the totalizer 7.

In order to avoid this, the lower end of the key stem 273 (Figs. 7 and 10) acts on the depression of the T. V. Prep. key, on the end 199 of the link 189, whereby the same is swung round its bearing 232 in the clockwise direction and the pin slot connection 193, 191 is rendered inoperative.

If the totalizer 7 is now brought into calculating position the previously mentioned mechanisms are influenced, the link 189 (Fig. 7) however, being only displaced backwards and forwards without operating thereby the cross totalizer total taking key lever 195, so that no total taking in the cross totalizer 121 can therefore follow. If now by operation of the T. V. key 586 (Fig. 19) the column totalizer total taking key lever 298 is swung, the total taking in the column totalizer 7 is initiated which is attained as follows.

For this purpose the carriage return key 603 (Fig. 12) is first depressed, whereby the paper carriage 10 moves into its extreme right-hand position. The paper carriage 10 is then moved by means of the tabulator key 9 to the left until the hundreds denomination of the column totalizer 7 has moved into the working position. It may still be remarked that the cross totalizers 120 and 121 are held in the left-hand position by a locking device, and are thereby prevented from participating in the movement of the column totalizers concerned by way of the driving device 313 and 312 (Fig. 12).

Now the T. V. key 586 (Fig. 19) is depressed, whereby the pawl 367 (Fig. 14) moves into engagement with the tooth wheel 376 by way of the parts 324, 344, 345, 346, 348, and the three cams 242, 364, 365 participate in the revolution of the shaft 243. The T. V. key 586 (Fig. 19) is also automatically held depressed, since on the depression of the T. V. key lever 298 this acts with its face 588 likewise on the flap 324 and thereby operates the same mechanisms which were operated on the depression of the T. C. key.

On the depression of the key lever 298 (Fig. 19) the same acts with its face 589 on the face 590 of the lever 591 and swings the same in the anti-clockwise direction round the screw 604, whereby the link 592 is moved downwards in the arrow direction 391 against the spring 595 en-

gaging with the arm 593 of the lever 594. Since the lever 594 is in connection with the link 592, the three-armed lever 594 is swung round its pivot 596 in the anti-clockwise direction. The locking member 598 fixed to the arm 597 thereby moves so as to lie under the part 599 of the aligning tooth 420 so that this is held in engagement with the teeth lying opposite to it at the time being of the driving wheels 421 of the column totalizers 1 to 8.

In the swinging movement of the lever 594 in the anti-clockwise direction, the lever 610 under the action of the spring 611, can also swing in the anti-clockwise direction, whereby the nose 612 of the coupling lever 613 mounted on the lever 610 moves so that it rests over the nose 614 of the draw lever 615.

In consequence of the downward movement of the link 592, the lever 616 connected with it and rigidly mounted on the shaft 617, as well as the shaft 617, are swung in the anti-clockwise direction. Since the lever 618 is likewise rigidly mounted on the shaft 617, so this is also swung in the same direction. By the swinging movement of the lever 618, the toothed wheel 450 (Figs. 19 and 17) is moved out of engagement with the toothed wheel 619, and into engagement with the toothed wheel 451, whereby the rotational movement in consequence of cutting out the intermediate drive 619, 620 is transmitted directly on to the main driving shaft 415, and accordingly the column totalizer 7 is acted on in the subtractive sense.

On the rotation of the three cams 242 (Fig. 14) 364, 365 first the toothed wheel 401 (Fig. 17) is moved into engagement with the teeth 406 of the calculating sector 407 by way of the parts 242, 387, 388, 390, 392 (Fig. 17) 394, 396, 399, 398 and 405. Further, the shaft 397 and the parts 422, 416, 412, 320 (Fig. 18) 418 (Fig. 19) 410, (Fig. 23) and 427 rigidly mounted thereon, are rotated in the clockwise direction by way of the parts 390, 392, 394, 396.

Moreover, the swinging movement of the shaft 397 in the clockwise direction (Fig. 23) the lever 427 is swung in the same direction whereby the levers 431 and 432 as well as the release fingers 434 and 433 are swung in the anti-clockwise direction by way of the parts 428, 429. This is however, unimportant, since the cross totalizers 120 and 121, as previously mentioned, are not located in the working position.

On the further rotation of the three cams 242, 364 and 365 (Fig. 14) the calculating sector 407 (Fig. 17) is swung in the anti-clockwise direction by means of the cam 365 (Fig. 14) and by way of the parts 439, 438, 441 (Fig. 17) 444, 445 and since the toothed wheel 401 is in engagement with the teeth 406 of the calculating sector 407, so the driving wheel 414 of the column totalizer 7 is rotated from "1" to "0", by way of the parts 402, 450, 451 and 415. Further rotation of the wheel 421 of the hundreds place is not possible. By the swinging out of the calculating segment 407 the number key striking yoke 458, 457, 456 is simultaneously moved forwards through one unit by the cam 364 (Fig. 14) by way of the roller lever 467, 468, whereby the number key lever corresponding to the value "1" is moved downwards and the "1" typed on the paper. Hereupon follows a carriage step to the left.

After the totalizer 8 is brought into calculating position by operation of the tabulator key 9 corresponding to the value indicated in the totalizer 8 it is likewise written empty.

After the total has been taken from the column totalizers 7 and 8 (Fig. 30) the lever 299 (Fig. 10) is swung in the clockwise direction round its bearing screw 300 by the depression of its key-shaped arm 306, whereby the nose 301 releases the bend 303 of the key lever 273 so that the latter and all the parts operatively connected therewith move back under the action of the springs 292 and 200 (Fig. 7) into their initial position illustrated in Fig. 10.

The locking slide 287 can be brought into operation also on the actuation of the T. C. key 509 (Fig. 10). To this end the angle lever 280 is displaced by an angle lever 621 with an extended arm 622 (Fig. 11) and the fixed connection 278, 279 replaced by a loose connection 623, 622.

If now the T. C. key 509 (Fig. 10) is automatically depressed, the key lever 195 acts on the arm 622 of the angle lever 621 and influences this in the clockwise direction round the bearing screw 281, whereby the locking slide 287 according to the foregoing is displaced in the arrow direction 582. The key lever 195 of the T. C. key 509 is so arranged in relation to the lever 621 that the locking slide 287 is not displaced so far as in the operation of the T. V. Prep. key 602. The proportions are generally so chosen that on the operation of the T. C. key 509 the locking slide 287 moves so that its noses 295 lie under the calculating key levers 296, while its nose 297 still remains in the range of the T. V. key lever 298 so that, therefore, the calculating keys 23, the column totalizer total taking key 586, and the space key 311 (Fig. 12) are locked.

This lock is released as soon as the cross totalizer total taking key 509, is automatically released again.

At this point it may be pointed out that the mechanism only becomes operative by the release of the carriage movement by the intermediary of the tabulating mechanism, whilst in the carriage movement released by the carriage release key C. R. (Figs. 1 and 7) or by the carriage back-space key B. K. whether operated by hand or by power, it remains inoperative.

When the noses 125 (Fig. 30) of the rider 124 act on the lever 126, only the parts 129, 135, 138, 142 which are in connection with this lever, are operated, while the lever 59, which is only capable of being influenced by the tabulating mechanism, remains uninfluenced.

Although, further, the total taking mechanism which is capable of being brought automatically into the working position for the total taking of the cross totalizers 120 and 121 is described, the mechanism instead of acting on the total taking member of the cross totalizers 120 and 121 can act quite as well on the total taking member for the column totalizers 1 to 8.

It may be further remarked that the connection 191, 193 (Fig. 9) need not be releasable and the control member 273 (Figs. 10 and 7) does not require to act on the rod 189, but that the member 273 can act rather by way of a suitable system of links on the lever 157 (Fig. 9) such that its pin 169 is not capable of acting on the angle lever 171.

I claim:

1. In a typewriter calculating machine or the like having a carriage, a tabulating mechanism for said carriage, control members selectively and adjustably arranged on the carriage, a member for initiating a total taking operation, and controlling means for automatically operating the initiating member, said controlling means in-

cluding a drive member operable by a part of the tabulating mechanism and means controlled by the control members on the carriage to render said drive member effective to operate the initiating member.

2. In a typewriter calculating machine or the like having a carriage, a tabulating mechanism for said carriage, a manipulative member for initiating total taking operation, controlling means including a connecting member connected to and operable by a part of said tabulating mechanism to form a connection between said part of the tabulating mechanism and said manipulative member, and members selectively and adjustably arranged on said carriage and operatively connected to said connecting member to render the latter effective to operate said manipulative member upon release of the tabulating mechanism.

3. In a typewriter calculating machine or the like having a carriage, a tabulating mechanism for said carriage, a manipulative member for initiating total taking operation, connecting means coupled with said manipulative member, a drive member connected with and operable by a part of said tabulating mechanism adapted to be brought into operative relation to said connecting means for automatic operation of said manipulative member, adjustable members on said carriage, and means controlled by one of said adjustable members and intermediate the latter and said drive member to render said drive member operative with relation to said connecting means for the automatic operation of the manipulative member.

4. In a typewriter calculating machine or the like having a carriage, a tabulating mechanism for said carriage, a manipulative member for initiating total taking operation, means connected to and operable by a part of said tabulating mechanism, means to actuate said manipulative member, control members selectively and adjustably arranged on the carriage, means operable by any one of said adjustable members to render the manipulative member actuating means effective to actuate the manipulative member, a drive shaft, a cam coupled with said drive shaft on operation of said manipulative member, and means controlled by said cam for rendering the manipulative member actuating means ineffective to actuate the manipulative member.

5. In a typewriter calculating machine or the like having a carriage, control members adjustably positioned on the carriage, a tabulating mechanism for said carriage, a manipulative member for initiating total taking operation, connecting means coupled with said manipulative member, a rockable member connected to and operable by a part of said tabulating mechanism adapted to be brought into operative relation to said connecting means, means operated by any one of said control members and including a spring for moving the rockable member into operative relation to the connecting means to actuate the manipulative member, a drive shaft, a cam coupled with said drive shaft on operation of said manipulative member, means interposed between said cam and said rockable member, said cam being adapted to release said manipulative member and to operate said interposed means to render said rockable member ineffective.

6. In a typewriter calculating machine or the like having a carriage, column totalizers on said carriage, crossfooters, first and second manipulative members for initiating total taking operations from said column totalizers and said crossfooters, respectively, connecting means detachably coupled with and effective to operate said second manipulative member, calculating key levers for initiating calculating operations in said totalizers and crossfooters, a space key lever for controlling the stepwise movement of said carriage, a locking member common to the first manipulative member, the space key lever and the calculating key levers, a third manipulative member connected with a part of said connecting means and adapted to operate said common locking member, said third manipulative member operating on its depression to detach said connecting means from the second manipulative member and operating said common locking member to unlock the first manipulative member and to lock said calculating key levers and said space key lever, locking means operable automatically on depression of the third manipulative member for maintaining the third manipulative member operative, and a manipulative member for actuating the locking means for the third manipulative member.

HUGO ERNST KÄMMEL. 50