Oct. 7, 1941. H. K. F. EWALD 2,258,090

BOOKKEEPING MACHINE

Filed Sept. 3, 1935 7 Sheets-Sheet 1

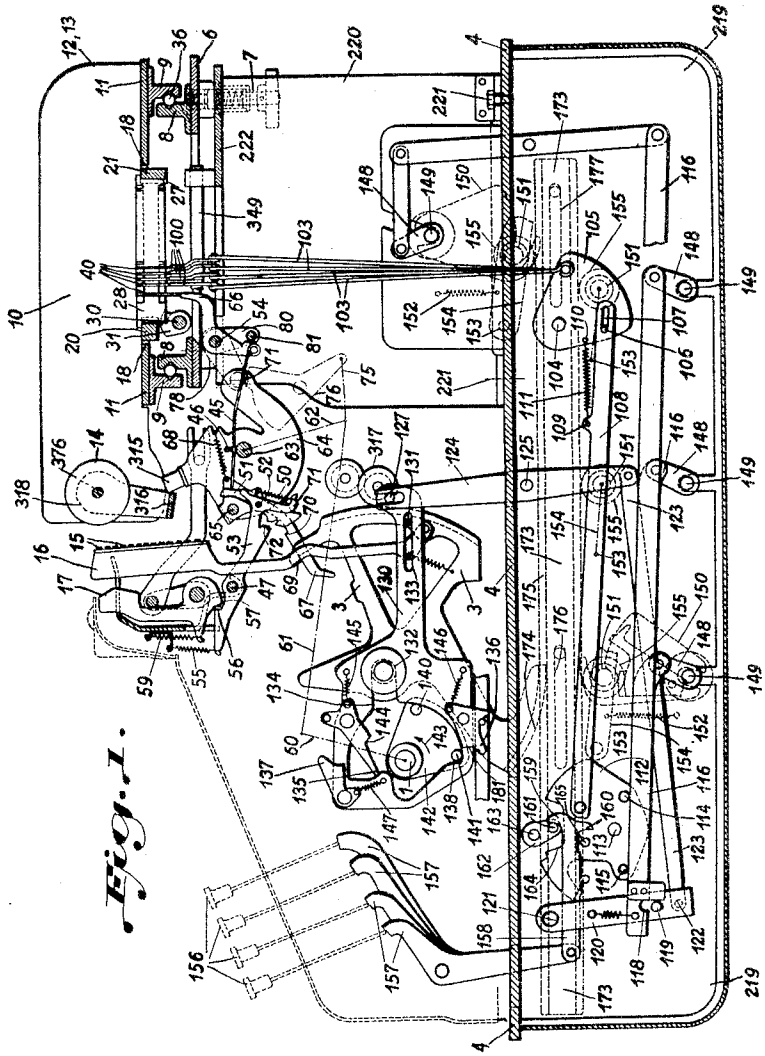


Fig. 1.

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By Bonnelycke, Young, Emery & Thompson Attys.

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BOOKKEEPING MACHINE

Filed Sept. 3, 1935 7 Sheets-Sheet 2

Fig. 2.

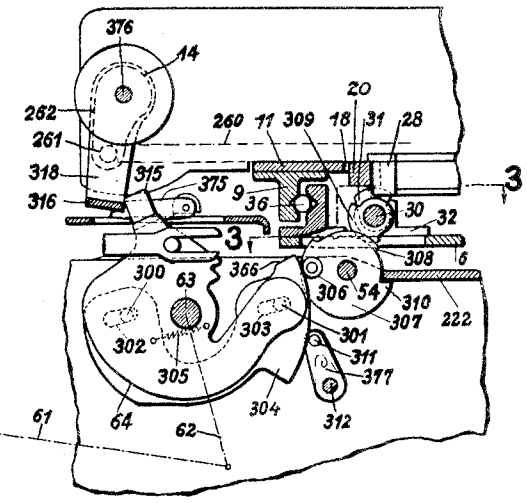


Fig. 2a.

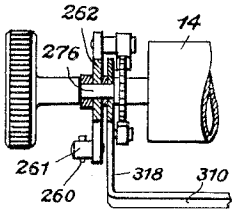


Fig. 4.

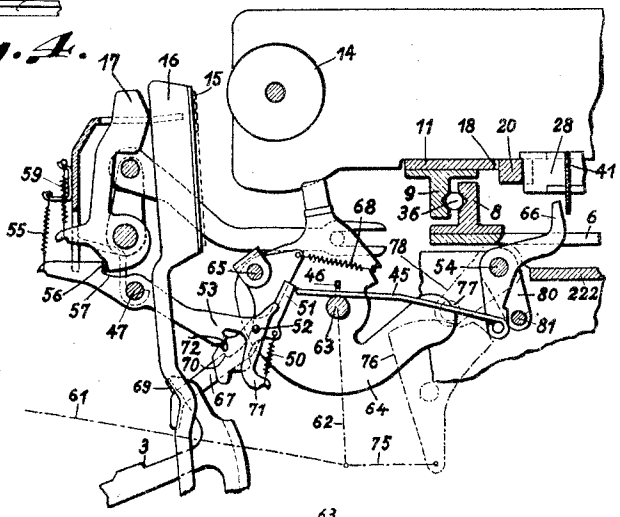
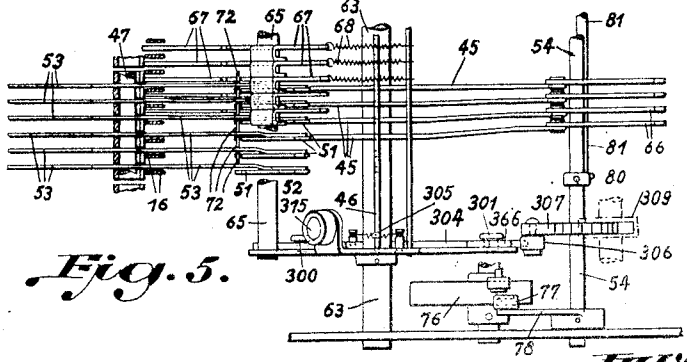


Fig. 5.



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Filed Sept. 3, 1935 7 Sheets-Sheet 3

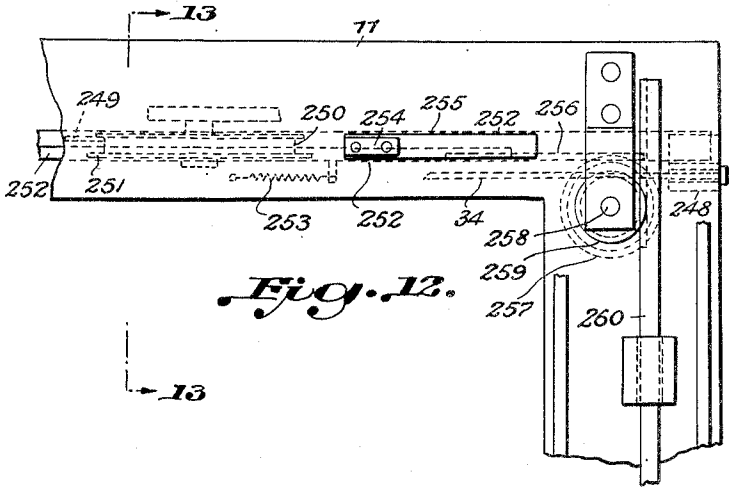


Fig. 12.

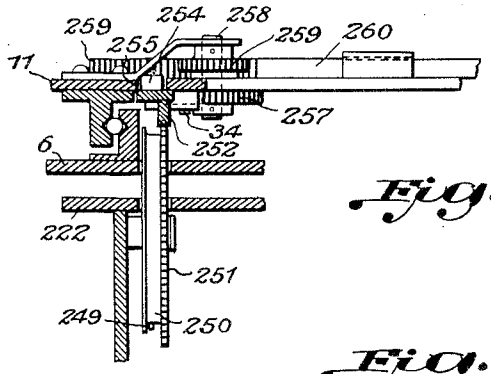
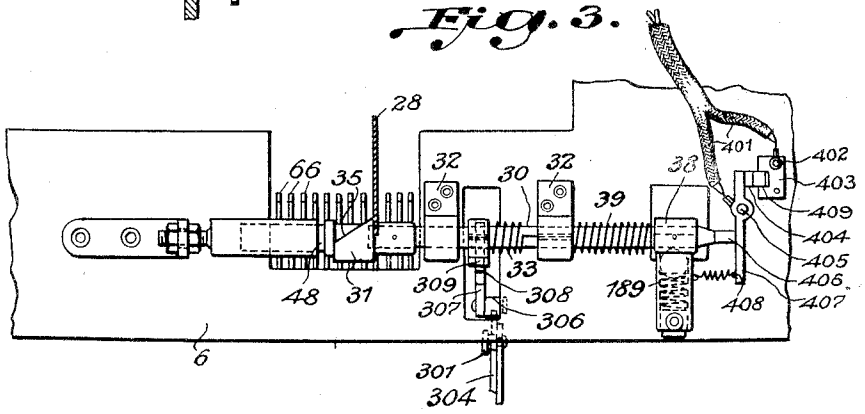


Fig. 13.

Fig. 3.



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Oct. 7, 1941. H. K. F. EWALD 2,258,090

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Filed Sept. 3, 1935 7 Sheets-Sheet 4

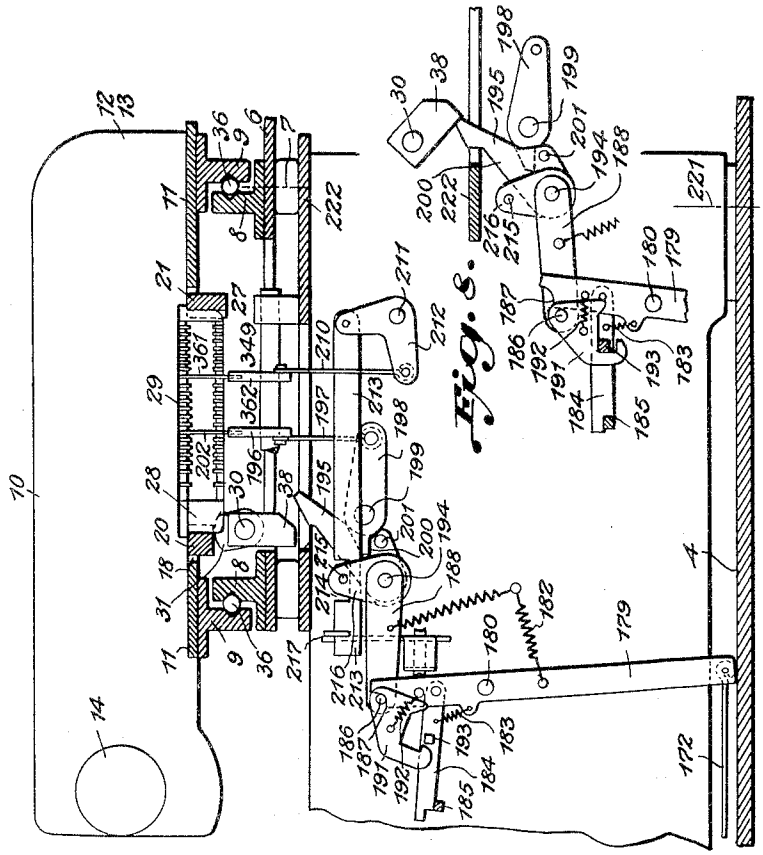


Fig. 6.

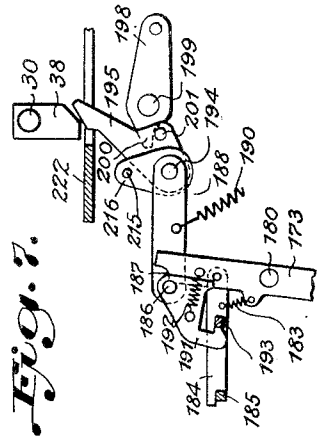


Fig. 7.

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Oct. 7, 1941. H. K. F. EWALD 2,258,090

BOOKKEEPING MACHINE

Filed Sept. 3, 1935 7 Sheets-Sheet 5

Fig. 9.

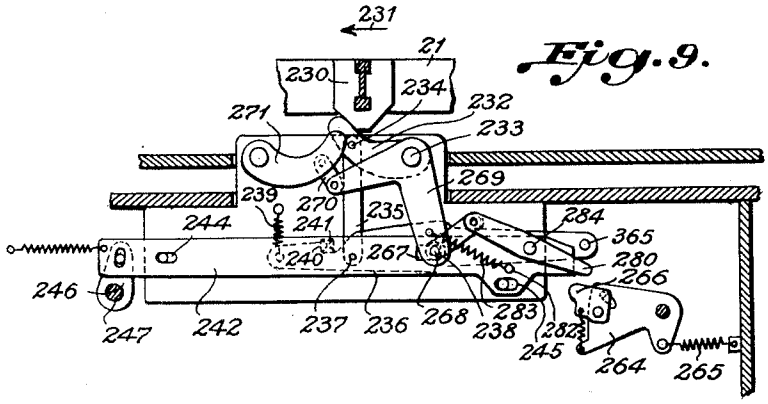


Fig. 10.

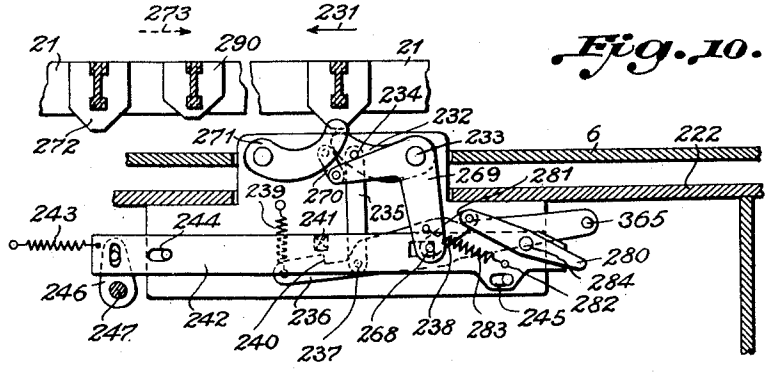
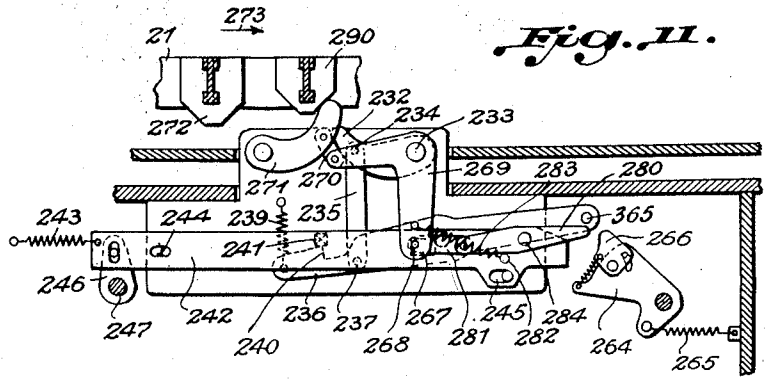


Fig. 11.



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Oct. 7, 1941. H. K. F. EWALD 2,258,090

BOOKKEEPING MACHINE

Filed Sept. 3, 1935 7 Sheets-Sheet 6

Fig. 14.

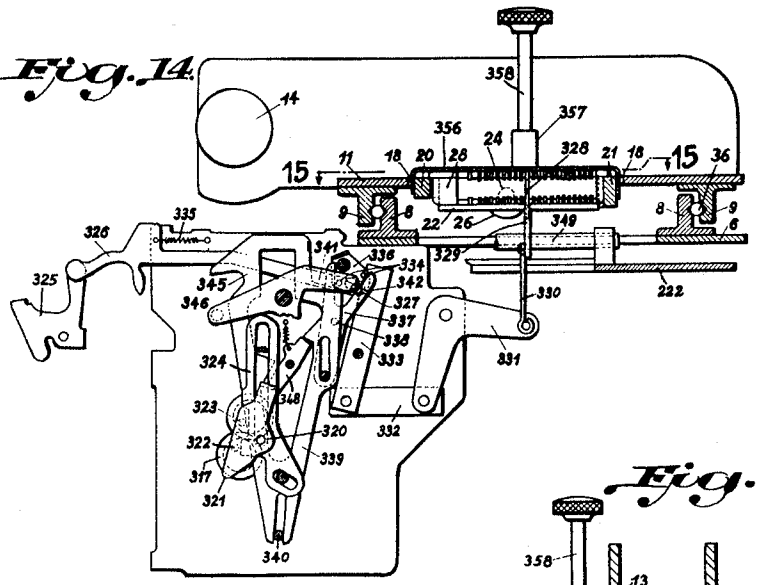


Fig. 16.

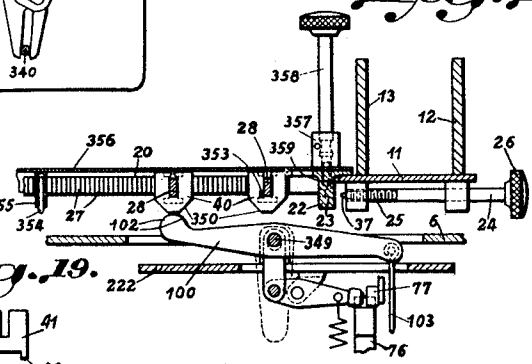


Fig. 17.

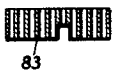


Fig. 19.

Fig. 18.

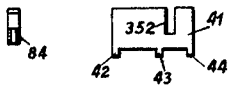
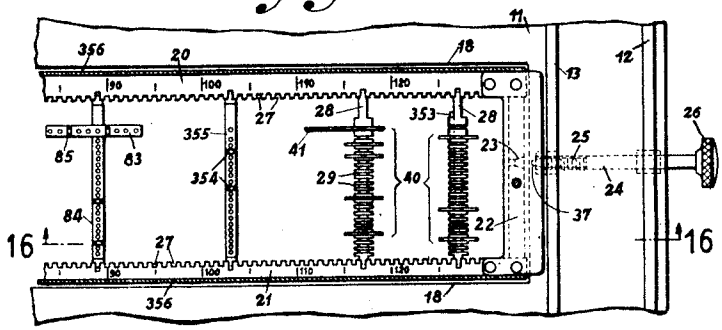


Fig. 15.



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Oct. 7, 1941. H. K. F. EWALD 2,258,090

BOOKKEEPING MACHINE

Filed Sept. 3, 1935 7 Sheets-Sheet 7

Fig. 14.a

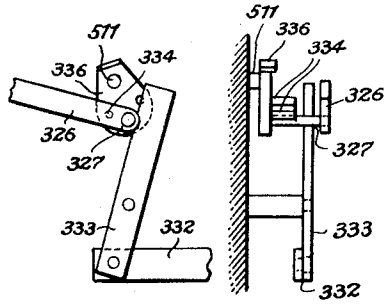


Fig. 14.b

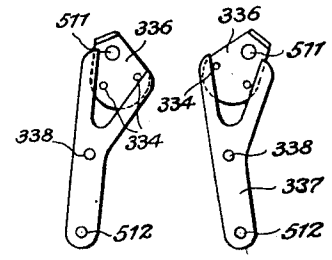


Fig. 14.c

Fig. 14.d

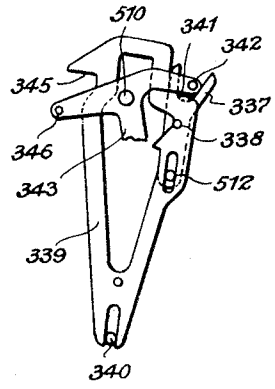


Fig. 14.e

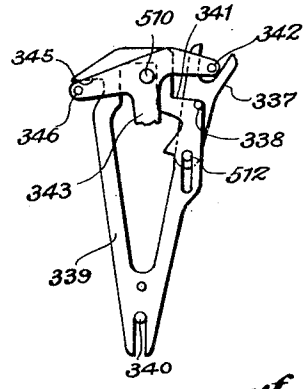


Fig. 14.f

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Patented Oct. 7, 1941 2,258,090

UNITED STATES PATENT OFFICE

2,258,090

BOOKKEEPING MACHINE

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Application September 3, 1935, Serial No. 39,065
In Germany September 7, 1934

6 Claims. (Cl. 235—60)

This invention relates to a bookkeeping machine, which in dependency upon the movement of the paper carriage, can be automatically conditioned or set for various working operations by means of control members.

The object of the invention is to provide a simple mode of control, which can be easily inspected, whereby all working operations of a bookkeeping machine can be automatically governed by the paper carriage movement. Another object is to provide an improved power transmission between the paper carriage and the various control devices of the machine. These objects of the invention are mainly achieved by arranging the control members beneath the two guide tracks of the paper carriage and by arranging said guide tracks widely spaced from each other. Further objects will be apparent from the following description taken in connection with the accompanying drawings.

A machine embodying the features of the invention is illustrated by way of example in the accompanying drawings in which:

Figure 1 is a general side elevation partly in section of the bookkeeping machine seen from the drive side with the covering hood removed;

Fig. 2 is a detail, shown on a larger scale and partly in section, of mechanism for the release of the paper carriage in its working condition;

Fig. 2*a* is a side view of one end of the platen;

Fig. 3 is a section of Fig. 2 taken on the line 3—3;

Fig. 4 is an elevational view of mechanism for the automatic subdivision of printing;

Fig. 5 is a plan view of the printing mechanism shown in Fig. 4;

Fig. 6 is a side view showing the skip or jump over mechanism for the carriage;

Figs. 7 and 8 are detail side views showing the parts of Fig. 6 in two different positions;

Fig. 9 is a detail side view showing mechanism for controlling the carriage return;

Figs. 10 and 11 are similar views showing the parts of Fig. 9 in two different positions;

Fig. 12 is a plan view showing the mechanism for counter-spring movement of the paper carriage and mechanism for a paper carriage return line spacing;

Fig. 13 is a section of Fig. 12 taken on the line 13—13;

Fig. 14 is a side view showing a change-over mechanism for conditioning an accumulator for subtraction;

Figs. 14*a* and 14*b* show details of Fig. 14 on a larger scale;

Fig. 15 is a cross-section on the line 15—15 of Fig. 14 showing holding means for the control members on the paper carriage;

Fig. 16 is a partial section on the line 16—16 of Fig. 15;

Fig. 17 is a section of Fig. 15 taken on the line 17—17; and

Figs. 17–19 show various details of Figs. 15 and 16.

The bookkeeping calculating machine illustrated by way of example in the drawings is provided in its front portion with a main shaft 1 for driving the machine and with rack sectors 3 which can be set by keys. By means of the rack sectors 3 numbers can be transferred into various accumulators or numbers stored in these accumulators can be taken out of them. In the machine illustrated, there is provided an adding and subtracting accumulator 317 directly engaging the rack sectors 3. The machine also includes a plurality of accumulators 155 which can be driven by intermediate members common to them, for example, racks 173 having teeth on both edges, the teeth engaging gears of the accumulators 155. The racks are actuated by separate tooth sets 174 on the rack sectors 3. In the machine shown in Fig. 1 three of the accumulators 155 are mounted between plates 219 which are firmly connected to a main base plate 4 consisting preferably of a smooth steel plate. This plate together with the plates 219 constitute a firm frame in which are mounted the various operative groups of which the machine consists. On the rear part of the frame, 4, 219, there is mounted a similarly constituted frame consisting mainly of side plates 220 and a top plate 222. This frame 220, 222 serves as a support for the paper carriage 10 and also carries a number of stops and control devices which cooperate with the paper carriage. The frame is removably connected with the main base plate 4 by screws 221.

A plate 6 is removably mounted by means of screws 7 on the plate 222; the plate 6 being preferably horizontal and has attached thereto guide rails 8 which may, for example, be riveted to the plate. The rails 8 together with a pair of inverted guide rails 9 and rollers or balls 36 inserted between cooperating rails, form the guide tracks for the paper carriage 10. The paper carriage 10 has a base plate 11 and a plurality of side walls 12, 13 in which a platen roll 14 is rotatably mounted. Types 15 on type bars 16 cooperate with the platen roll for printing. The type bars 16 are operated from the rack sectors 3 and when the latter are set the type bars as-

sume corresponding levels for correct printing. Printing is effected by means of hammers 17 which impel the type bars 16 towards the platen roll 14. The printing strains are well taken up by the carriage guide means 8, 9. In the base plate 11 of the paper carriage is provided an opening 18 for the reception of a frame composed, for example, of a front bar 20, a rear bar 21 and two lateral connecting braces 22 (Figs. 15—16). The side braces 22 of the frame 20, 21, 22 rest upon the base plate 11 of the carriage. The brace members 22 are provided on their outer sides with counter-sunk bores 23 (Figs. 15 and 16) into which rotatable pins 24 each of which is provided with a screw thread 25 and operating knob 26 can enter. The axes of rotation of the pins 24 are slightly displaced in downward direction relatively to the axes of the counter-sunk bores 23, the ends 37 of the pins being tapered. By these means when the screw pins 24 are screwed home, the frame 20, 21, 22 is brought into a definite determined position as can be easily understood from Fig. 16.

The front bar 20 and the rear bar 21 are provided with opposite aligned slots 27 preferably milled therein. These slots 27 receive bars 28 serving as holders of control members, the bars 28 have preferably the form of cross-section shown in Fig. 16 which is interrupted at several places by recesses or slits 29 (Fig. 15). The two ends of each bar 28 are preferably so formed that they fit in the slots 27 of the frame 20, 21, 22.

Below the front bar 20 which in the machine illustrated has a somewhat smaller thickness than the rear bar 21, a stop 31 is fixed on a rotary rod 30 (Figs. 1, 2, 3 and 6). The rod 30 rotates in bearings 32 on the plate 6 (Fig. 3) by means of a spring 33 which constantly urges the rod in counter-clockwise direction, view from the left in Fig. 3, whereby the stop 31 can assume the position shown in Fig. 2 in which it bears against one of the control member holders 28 when the paper carriage is drawn in its working direction by means of a carriage operating spring. Upon movement of the paper carriage 10 in the opposite direction, the opposite side of the stop 31 comes into contact with the control member holders 28, and this side of the stop 31 having a ramp or cam surface 35 (Fig. 3), when the paper carriage is moving in this direction it will not be arrested by stop 31. The paper carriage, on the other hand, in this direction of movement imparts through each control member holder 28 a clockwise rotation, view from the left in Fig. 3, to the stop 31, and the latter after passage of each holder 28 is at once restored by the spring 33 into its initial or locking position. This locking position is determined by a lock member 38 (Figs. 3 and 6) which can bear against an abutment 189 fixed to the plate 6. In the machine illustrated in Fig. 3, the abutment 189 is a yielding abutment consisting of a sleeve containing a ball pressed outwardly by a spring.

The release of the control member holders 28 forming stops for the carriage escapement (Fig. 2) by the counter stop 31 in the machine illustrated is effected in dependency on the machine drive, namely, by the shaft 63 operated in each machine operation. The disk 64 has two pins 300, 301 (Fig. 2) serving to guide an actuating member 304 provided with slots 302, 303. The actuating member 304 is urged to the right (Fig. 2) by spring 305 and thereby bears against a roller 306 on a freely rotatable disk 307. The disk 307 has teeth 308 engaging a segment 309 fixed on the rod 30. Also the disk 307 may be provided with a spring whereby even when the paper carriage is removed and thereby the disc 307 comes out of engagement with the segment 309 a shoulder 310 of the disc 307 will always bear against the plate 222.

The retraction of the counter stop 31 from the path of a holder 28 is effected in the following manner: During the forward stroke of a machine operation the disk 64 (Fig. 2) rotates in clockwise direction and the actuating member 304 slides past the roll 306 and is moved to the right by the spring 305. At the end of the backward movement the upper surface 366 of the actuating member 304 strikes against the roll 306 thereby rotating the disk 307 in clockwise direction and deflecting the counter stop 31 out of the path of the stop forming holder 28. On further upward movement of the roll 306 the latter comes out of engagement with the surface 366 of the actuating member 304, thus releasing the spring 33 (Fig. 3) whereby the latter at once swings the counter stop 31 into operative position before the next holder 28 comes into its path and the actuating member 304 is returned against the action of its spring 305 to its original position.

In the machine illustrated there is also provided a locking lever 377 (Fig. 2), a pin 311 of which can obstruct movement of the actuating member 304 to the right if after a machine operation the paper carriage is not to be impelled further. When the line spacing motor key is actuated this locking lever 377 is automatically deflected by link connections about its axis 312 in counter-clockwise direction into its effective position shown in Fig. 2.

The above described operation of the lever 377 serves to render the carriage escapement device inoperative. When the machine has to book a plurality of amounts under each other in a particular column, without the carriage after each machine operation skipping to another column, then by actuating the line spacing motor key, the lever 377 is automatically turned counter-clockwise about its axis 312, whereby the operating member 304 cannot move to the right under the action of the spring 305 and, if the disc 64 turns during a machine operation first clockwise and then counter-clockwise the surface 366 does not come into contact with the roller 306 of the disk 307. In such a machine operation, therefore, release of the carriage by the operating member 304 does not take place.

To prevent the paper carriage 10 from striking too abruptly against the control member holders 28, the rod 30 with the stop 31 is arranged to slide a small extent against the action of a spring 39 (Fig. 3). This buffering is so arranged that the spring action will always cause the several control member holders 28 to give the paper carriage 10 a precise end position. Furthermore, the impact on the rod 30 can be rendered noiseless by providing, for example, a rubber cushion 48 (Fig. 3).

The holders 28, as shown in Figs. 15 and 16, have any desired number of slits or grooves 29 for supporting control members 40. These control members are intended for the initiation of various working operations of the bookkeeping machine in any desired paper carriage positions. They may all be of similar shape or they may have shapes adapted for the various modes of operation.

The control members 40, according to the position in which they are mounted on the holders 28, perform various functions. For example, in the machine illustrated, control members are provided whereby in determined paper carriage positions, the printing mechanism can be automatically subdivided in such a manner that determined printing hammers 17, in a manner hereinafter described, can be rendered operative or inoperative for the purpose of automatic zero printing. For this purpose, for example, there are used the row of control members 41 (Figs. 15 and 19), 83, 85 (Figs. 15a and 17) located nearest the platen 14. One group of control members 40 (Figs. 15 and 16) is assigned to the automatic coupling and decoupling of determined accumulators 155 (Fig. 1). Other control members 40 (Figs. 15 and 16) initiate determined modes of operation of the accumulators, for example, subtraction, non-addition, total and subtotal taking. Further control members 40 (Figs. 15 and 16) may be provided for controlling the automatic printing of the date. Other control members 40 may be provided for controlling a carriage escapement mechanism; others may be provided for controlling the automatic separation of positive and negative amounts so that such amounts are received in separate accumulators in different paper carriage positions in different columns of an account sheet. Additional control members control the paper carriage restoring mechanism in such a manner that it can be restored from the end of a printing line to its initial or to an intermediate position, automatically. Other control members may be provided for any other desired working operations. The essential feature is, in this connection, that the controls shall be arranged internally between the two guide tracks of the paper carriage. By this means power transmission is effected from the part cooperating with the control members 40, at a favorable place between spaced bearing members 8, 9 and a third carriage guide means, such as is frequently necessary, is dispensed with. The control members 40 (Fig. 16) may be provided with bevels 350 in order that they will strike more gently against setting devices 100 arranged on the fixed part of the machine. Obviously, the setting members also may have bevels 102. The members 40 shown have an intermediately located slot 352 by means of which they can be inserted from below onto the holder 28 at its place of small cross-section. The control members can be riveted or otherwise permanently connected in their positions on the holder 28 when determined working operations are to be permanently performed by the machine. Such a control member holder with control members set in position thereon can easily be inserted in the machine and removed therefrom. Also a changing of such control member holders for other paper carriage positions is quite simple. Since both the stops 28 for arresting the paper carriage and also the control members for all the working operations to be automatically carried out in a paper carriage position, can be removed by hand without difficulty, machines equipped with such control member holders can be rapidly conditioned for other operations.

When frequent reconditioning of the machine for quite different working operations has to be carried out, control member holders with control members riveted thereto are preferably not used. In this case, it is preferable to retain the control members on a holder by means of an inserted locking pin 353 as shown in Fig. 16, to prevent them from falling off. This pin can be withdrawn to permit the control member retained thereby to be removed or exchanged.

Control members can also be used in the form of pins 354, Figs. 15 and 16, for example, insertable in a holder 355 provided with corresponding holes. The pins 354 are preferably provided with heads which bear against the top of the holders and are retained by an upper retaining plate or locking member 356. This strong retaining plate 356 is well adapted to take up pressure transmitted to the pins or holders 354. On the retaining plate 356 projecting portions 357 are provided in which fixing members 358 are rotatably mounted, the fixing members 358 having operating knobs. The fixing members 358, as illustrated, are screw-threaded at their lower end 359 and are thereby connected with the frame 20, 21, 22 carrying the control members.

To subdivide the printing mechanism the control members according to Fig. 19 have a special shape as indicated by 41 comprising for example three lugs 42, 43, 44. In its working position, the control member 41 lies above feeler members 66 shown as bell cranks rotatably mounted on a common shaft 54 to the lower arms of which bell crank rods 45 are jointed (Figs. 1 and 4). The rods 45 are guided between the teeth of a comb 46 which is arranged above a shaft 63, Fig. 4, and attached to lateral disks 64. Against the front ends of the rods 45 pawls 51 are urged by springs 50 which pawls are rotatably mounted on pins 52 on the downwardly bent ends of the locking members 53. The springs 50 have one end attached to the pawls 51 and the other end to lower extensions 71 of the locking members 53 (Fig. 4). The locking members 53 which are rotatable on a shaft 47 are acted upon by springs 55 and are provided with shoulders 56 engaging shoulders 57 of the printing hammers 17. The printing hammers 17 have horizontal arms cooperating with springs 59 by means of which the type bars 16 are impelled towards the platen roll 14 as soon as the printing hammers 17 are released by the shoulders 56 of the locking members 53.

The release movement of the locking members 53 is effected from the machine drive. For this purpose the main drive shaft 1 carries an arm 60 connected to one end of a link 61, the other end of which link is jointed to an arm 62 on a shaft 63, said shaft having the disks 64 affixed thereto (Figs. 1 and 4). The disks 64 are connected to each other by a bar 65 on which levers 67 are rotatably mounted. The levers 67 are constantly urged in clockwise direction by springs 68 engaging one arm thereof so that as shown in Figs. 1 and 4, their other arms normally bear against lugs 69 on the rack sectors 3. As long as the lugs 69 are in their positions as shown in Fig. 4, the levers 67 cannot move clockwise. In this condition the lower extensions of these levers can slide on the lug 69 while the machine is in operation with the shaft 63 rotated from the drive shaft 1. It is only when a rack sector 3 has been elevated causing the lug 69 to move upwardly and thus release the levers 67 for movement in clockwise direction by springs 68, that the rotation of the shaft 63 at the end of the forward stroke of the machine, causes a hook 70 of the lever 67 to engage a lug 72 of the locking member 53, and releases the

corresponding printing hammer 17 to strike the type bar 16.

The pawls 51 under the action of the springs 50 also engage lugs 72 of the locking members 53 (Fig. 5), but in such a manner that the pawls 51 lie beneath the lugs 72 of the next lower printing device. When a locking member 53, the pawl 51 of which has engaged the locking member of the next lower printing device, is moved upwardly by means of its right-hand arm, Fig. 4, it also carries with it the next lower printing member and thereby also releases the hammer 17 of said member. If at this lower printing position the corresponding pawl 51 is also engaged with the next lower printing device, then also this further printing device is released for printing. In this manner all the type bars to the right of a certain printing position, as viewed from the front of the machine, in which a number is to be printed in a machine operation, are automatically released down to the lowest ordinal position, or to a printing device whereof the pawl 51 is out of engagement. Thus all the printing hammers up to this position are automatically released. Thereby zeros are automatically printed in all positions at which the type bars 16 are not set to digits by means of the racks 3.

According to the invention the pawls 51 when the machine is at rest lie out of engagement with the locking members 53. In this condition they lie, under the control of their springs 50, against the ends of the rods 45 and urge the lower arms of the bell cranks 66 against a rod 81 (Fig. 4). The rod 81 is fixed on arms 80 of the freely rotatable shaft 54. The rotation in clockwise direction of the shaft 54 under the action of the springs 50 is limited by an arm 78 having a roller 77 bearing against a shoulder on a cam disk 76. The number of rods 45 and bell cranks 66 corresponds with the number of ordinal places of the machine.

The cam disk 76 is jointed to a link 75 which in turn is jointed to the end 62 of the rod 63. During the forward stroke of an operation of the machine the cam disk 76 has a clockwise rotation. At the beginning of this rotation, the roll 77 rolls off reach of the high portion on to the low portion of the cam disk 76, whereby the shaft 54 and the bell crank 66 can perform a counter-clockwise rotation, and the rods 45 a right-hand movement under the influence of the springs 50 so that the pawls 51 at the beginning of the forward movement of the machine engage the lugs 72 of the locking members 53 and determine automatic zero printing of the printing mechanism.

When the lower arms of the bell crank 66 are rotated counter-clockwise in the course of the machine operation, their upper arms rotate upwards (Fig. 4). As soon, however, as one or a plurality of these horizontal arms is obstructed in its forward movement, for example, by the lugs 42, 43, 44 or contact surfaces of the control member 41 (Fig. 19), the corresponding bell cranks 66 remain in their positions of Fig. 1 as do likewise the corresponding rods 45 and pawls 51. In the case of the locking members 53 which do not carry engaged pawls 51, the locking members 53 of the next lower printing devices are not carried along for automatic release of the corresponding printing hammer 17. On the other hand, automatic zero printing is rendered inoperative at the printing positions determined by the lugs 42, 43, 44. The main advantage of this arrangement according to the present invention is that the paper carriage has no contact during its motion with the means for rendering operative and inoperative the automatic zero printing at desired printing positions. Thus the paper carriage moves noiselessly in both directions at a slight distance above the control members or feelers 66. The control members 41 may be provided with any desired number of lugs and the lugs may be arranged at any desired printing position. When various subdivisions are desired in different paper carriage positions, this can be rapidly and simply effected merely by inserting correspondingly shaped control members 41.

Obviously holders 83 as shown in Fig. 17 can be used, said holders being arranged transversely on control member holders 84 (Figs. 15 and 18) and in which at determined positions corresponding to the printing positions, pins or stops 85 can be inserted for cooperating with the feelers 66 to effect subdivision of the printing mechanism.

Some of the control members 40 of Fig. 1 cooperate with double-armed levers or setting devices 100 (Figs. 1 and 16), pivoted on a shaft 349. The levers 100 may also be in the form of bell cranks with arms of any desired length. The levers or equivalent members 100 may be provided with impact surfaces 102 cooperating with the control members 40. As shown, the right-hand ends of some of the levers 100 are connected by cables 103 with disks 105, (Fig. 1), freely rotatable on pins 104. Pins 106 on these disks 105 project into slots 107 in bars 108 urged to the right by springs 111 which springs engage pins 109 of the bars 108 and pins 110 of the disks 105. The various bars 108 are jointed at their forward ends to actuating disks 112 rotatably mounted on a common shaft 113. Each actuating disk 112 has two striker pins 114, 115 which can selectively cooperate with coupling rods 116, which serve for engaging the accumulators. The parts are preferably attached to common retaining plates removably attached to the base plate 4 and can thus be mounted and dismounted as units.

When a control member 40 imparts a counter-clockwise rotation to a lever 100, (Fig. 16), and the corresponding cable 103 moves upwardly, the corresponding disk 105 thereby is rotated in counter-clockwise direction. By means of the spring 111 and the bar 108 the actuating disk 112 is rotated and the striker pin 114 presses one of the coupling rods 116 downwardly. The coupling rods 116 have a slot 118 in their lower edge by means of which they engage in their downward movement with a pin 119 in a yoke 120. The yoke 120 which has two arms, is pivoted about a pin 121 and in its rotation it reciprocates the coupling rod 116 which is engaged with the pin 119.

The coupling rods 116 are jointed to levers 148 on shafts 149 on which are fixed cam disks 150 (Fig. 1). The counter-clockwise rotation of the cam disks 150 cause accumulator shafts 151 to move upwardly against the action of springs 152 which shafts 151 carry arms 154 rotatable about shafts 153. As a result of these upward movements numeral wheels 155 on the accumulator shafts 151 engage racks 173 which are reciprocated during each movement of the rack sectors 3, by means of the teeth 174, 175, said movement being guided by pin and slot devices 176, 177.

According to which instant of the machine operation the accumulator 155 comes into and out of engagement with the racks 173, different calculating operations are performed by the accumulator 155.

As already stated, the engagement and disengagement of the accumulator are effected from the yoke 120 by the pin 119. The yoke 120 in its turn is in driving connection through a rod 123 attached to a joint pin 122, with an arm of a double lever 124 pivoted on a pin 125. The upper arm of this lever is forked and engages a pin 127 of a movable control head 130, serving for engaging the accumulators, which is guided in the machine frame by means of pins 131, 132 and slots 133, 134. The control head has a broad front end carrying a plurality of pawls 135, 136, 137 and an impact surface 138 by means of which it can cooperate selectively with pins 140, 141 of a drive disk 142 fixed on the main shaft 1. The pawls 135, 136, 137 can be brought selectively into and out of engagement with the pins 140, 141 by means of their springs 145, 146, 147. The control of the pawls 135, 136, 137 can be effected manually or automatically through the paper carriage movement.

If, for example, (Fig. 1) the pawl 135 is engaged, then the pin 140 in its rotation in the direction of the arrow 143, moves past the pawl 135 at the end of the forward stroke and deflects the pawl only slightly against the action of the spring 145. At the beginning of the backward stroke the pin 140 then encounters the nose 144 of the pawl 135 and thereby moves the control head 130 to the right.

The control head 130 remains in this right-hand position until at the end of the back stroke of the main drive shaft 1 it is returned to its normal position by the pin 141 striking the impact surface 138.

The described operation of the machine in which the control head 130 is moved to the right at the beginning of the back-stroke and is returned to the left at the end of the back-stroke, is used for carrying out addition operations. At the end of the return stroke of the machine, the pin 141 on the disk 142, as previously described, will move the control head 130 back to the left and thus rotate in clockwise direction the cam disk 150 of any engaged accumulator 155, whereby the accumulator axis, under the action of the spring 152, is shifted into the position shown in Fig. 1 in which the accumulator is out of engagement with the racks 173.

Each accumulator 155 has its own tens-carrying mechanism which may be of any desired type. Preferably, however, a tens-carrying mechanism is used of the type in which tens-carrying is first merely prepared and is subsequently completed after the actuator racks are disengaged. For adding and subtracting accumulators, tens-carrying mechanism such as shown in German Patent No. 467,756 may be used. Owing to the separate tens-carrying for all the accumulators, the machine illustrated may have a plurality of accumulators simultaneously engaged with the racks 173.

For taking a total the pawls 136, 137 are actuated (in known manner) manually or automatically but the pawls 135 are brought out of engagement. In this case the pin 141 in its counter-clockwise rotation at the beginning of the forward stroke encounters a shoulder 181 of the pawl 136 and thus pushes the control head 130 to the right. In this position the control head 130 remains until at the end of the forward stroke it is returned by the pin 140 and the pawl 137. Owing to the previously described formation of the cam disks 150, the aforesaid raising and lowering of the accumulator axis 151 takes place during movement of the cam disks 150. By means of a spring 152, an exact bearing of the axis of the accumulator 155 on the cam disk will be ensured. For taking sub-totals the pawl 136 is engaged manually or automatically whereby at the beginning of the forward stroke the control head 130 is pushed to the right. The return movement of the control head 130 in sub-total taking is effected by means of the pin 141 and the impact surface 138.

Non-addition is effected by holding all the pawls 135, 136, 137 out of engagement during the whole machine operation. This may also be effected by hand in the usual manner through a non-add key, or automatically by the paper carriage.

In the machine illustrated, the engagement and disengagement of the accumulator takes place entirely positively from the machine drive by the movement of the control head 130 and the parts 124, 123, 122 and 116. In this connection, it is nevertheless, possible to effect a desired machine operation, to engage accumulators other than those which are to be automatically selected at a definite paper carriage position. For this purpose an engagement device is provided which automatically renders inoperative all conditioning operations set up by the paper carriage for engaging accumulators, as soon as an accumulator is engaged by means of a key assigned thereto.

For this purpose in the machine illustrated having four accumulators 155 three of which are arranged below the racks 173 the fourth being provided above the racks 173, corresponding keys 156 are provided which cooperate with bell cranks 157 (Fig. 1). At the lower arms of the bell cranks 157, there are arranged slides 158 each having an upper lug 159 and a lower lug 160. The upper lug 159 bears against a rod 161 of an arm 162 pivoted on a pin 163. When a key 156 is actuated the arm 162 is rotated in clockwise direction. By means of the rod 161 which bears against the left-hand edges of grooves 164 in the disks 112, all those actuating disks 112 are restored which had been given a clockwise rotation by the paper carriage movement upon shifting of the parts 103, 105, 108. Thereby the bars 108 are again moved forwardly with their guides 107 on the pins 106 against the action of the springs 111.

The disks 105 and the cables 103 can thus remain in positions given by the paper carriage movement. By the movement initiated by one of the slides 158, all the engaging devices operated by the paper carriage to engage accumulators are rendered inoperative.

Simultaneously the left-hand movement of the slide 158 also actuates through its lower shoulder 160, a pin 165 on the actuating disk 112 cooperating with the slide. Hereby the actuating disk 112 effects a counter-clockwise rotation in which the pin 115 encounters the corresponding coupling rod 116 and forces the latter downwardly. In this downward movement, the slot 118 engages the pin 119 which in the next following machine operation renders operative the accumulator 155 corresponding to the depressed key. Obviously in the machine according to this invention, it is also possible by

depressing a plurality of the keys 156 to render a plurality of accumulators simultaneously operative.

In the present construction a skip key 170, by actuation of which the drive motor for the operation is coupled to the machine drive, in manner known per se, causes a bell-crank 171 to be rotated in clockwise direction, to the lower arm of which bell crank is jointed a link 172. The rear end of the link 172 is attached to a lever 179 pivoted at 180. By depression of the skip key 170 the lever 179 is rotated in clockwise direction against the action of its spring 182. Hereby, a locking lever 184 is brought by means of a spring 183 into engagement with a pin 185 to lock lever 179, Figs. 7 and 8, against premature backward movement. Also, the clockwise rotation of the lever 179 releases a pin 186 on a lever 188 from a notch 187. This enables the lever 188 to be rotated in counter-clockwise direction (Figs. 7, 8) under the action of a spring 190 and during this rotation the locking pawl 191 moves downwardly and under the action of a spring 192 bears against a square pin 193 on the downwardly shifted locking lever 184. The lever 188 then rotates under the action of the spring 190 to such an extent that a lever 195 attached on the same shaft 194 as the lever 188, is brought to bear against the locking member 38. This limits the movement of the lever 188. If, for example, the stop 31 (Fig. 6) of the shaft 30 is shifted to release carriage movement, then the locking member 38 moves into the position shown in Fig. 8 whereby the lever 195 follows the tension of a spring 196 and can come below the locking member 38, as shown in Fig. 8. As long as the locking member 38 is thus held in its shifted position, the stop 31 is kept out of engagement with the control member holders 38 of the paper carriage to perform any desired movement in the work direction under the action of its operating spring. On restoration of the lever 195 from the position shown in Fig. 7 to that shown in Fig. 8, the lever 188 also is rotated under the action of the spring 190 by a certain amount. The locking pawl 191 then brings its lug under the square pin 193 and places itself, under the action of the spring 192, in the position shown in Fig. 8. This effects a further limitation of the rocking movement of the lever 188 and also of the lever 195 because the square pin 193 brings its upper contact surfaces against the locking pawl 191.

The paper carriage movement according to the present invention can be stopped by means of control members on the paper carriage. For this purpose control members 202 (Fig. 6) are used which cooperate with a double-armed lever 196. At the free end of this lever 196, there is connected a cable 197, attached to a lever 198. The lever 198 is fulcrumed at 199 and has a nose 200 for moving downwardly a pin 201 on the lever 195.

When a control member 202 engages lever 196, the cable 197 is pulled upwardly which movement gives the lever 198 of Figs. 6, 7, and 8 a counter-clockwise rotation causing it to urge the lever 195 in clockwise direction against the action of the spring 190. The rotation is of such extent that the upper end of the lever 195 comes out of the path of the locking member 38. Hereby, the stop 31 can again snap back under the action of its spring and can be retained by the next holder 28. The lever 188 being rotated in counter-clockwise direction carries with it against the action of the spring 183 the locking lever 184 because the locking pawl 191 engages the square bolt 193 provided on the locking lever 184, and the lever 179 is released from its locking by the bar 185. Hereby the lever 179 can follow the urge of its spring 182 and restore the jump over key 170 to its normal position.

The same skip key 170 in the machine illustrated can serve another purpose. Actuation of the key 170 and the resulting shifting of the parts then can take place in the same manner as above described. However, the restoration of the shifted parts is effected by different means. This restoration takes place in dependency on a control member of the paper carriage, only in quite specific cases, remaining inoperative in other cases. Thus, for example, in one specific position of the paper carriage a control member may be so arranged that it arrests the paper carriage only when an accumulator contains a negative amount; but with a positive amount it will allow the paper carriage to continue its movement for a certain extent, for example, one column width farther. Arrangements of this kind are used mainly in separating positive and negative balances.

For this purpose the machine illustrated has control members 361 (Fig. 6) on the holders 28 which members 361 cooperate with a double-armed lever 362. The free end of this lever has attached thereto a cable 210 which is connected to a bell crank 212 rotatable on a fixed fulcrum 211, the vertical arm of which bell crank has jointed thereto a slide 213 in such a manner that this slide can also perform a small movement out of the plane of the drawing. The slide 213 is provided with a recess into which a pin 215 can project, which pin 215 is fixed on an arm 216 attached to the shaft 194. The recess 214 is of such size that the pin 215 during the movement of the arm 195, effected by depressing the key 170, will not strike against the left-hand edge of the recess. As the lever 195 is shifted to the right, it no longer holds the locking member 38 in the shifted position, so that the spring 33 can return the rod 30 and also the locking member 38 and the stop 31 into normal position, Fig. 3. On the other hand when the cable 210 is moved upwardly by a control member 361 on the paper carriage, the slide 213, along with its left-hand recess 214, the lever 216, and the lever 195, can rotate in clockwise direction to release the locking member 38. In this case, the carriage movement initiated by the skip key 170 is arrested by the control member 361. This operation takes place automatically when, for example, the number in the balance totalizer is a positive number.

In the case of a negative totalizer content the paper carriage is to be arrested in a later column of the account sheet. For this reason the arrangement is made such that the slide 213 although moved by the control member 361, can be brought out of contact with the pin 215. This is effected according to the invention by connecting the slide 213 through an intermediate member 217 with a known device which varies its position upon change of the nature of the amount in the accumulator. For example, the intermediate member 217 may be engaged by a device such as described in Austrian patent specification No. 142,720, the part designated in the drawings of the cited specification with the reference character 29 then forming the intermediate member 217. In such a case the slide 213, when the

amount in the accumulator is negative, is swung toward the back vertically relative to the plane in Fig. 6 by means of the intermediate member 217 so that it will arrive without contact with the pin 215 and the arm 216. Thus when a negative amount is in the accumulator the control member 361 has no influence on the control of the movement of the paper carriage. The paper carriage thus does not come to rest in a column setting in which it is to stop when the accumulator contains a positive amount, but it is movable further until such a time that a control member 202 reaches the carriage which as described in the foregoing cooperates with the lever 198. The control member 202 is thus placed in a position for the next column setting of the paper carriage. If, however, a control member 202 is not in position then the paper carriage will be carried further to the end of the printing line to then be automatically returned.

Automatic carriage restoration may be effected as shown in Figs. 9, 10, and 11 by control members, as in the case of the other automatic working operations. For this purpose, there is preferably arranged at the end of a printing line a stop member 230 which cooperates with a lever 232 in movement of the paper carriage in the direction of the arrow 231. The lever 232 is loosely rotatable on a pin 233 and has a pin 234 connecting it to a link 235 which link is jointed to a pin 237 of a locking lever 236. The locking lever 236 is fulcrumed about a pin 238 and is constantly urged in clockwise direction by a spring 239. By means of a lug 240, the lever in the position of rest shown in Fig. 9 engages a pin 241 provided on a slidable rod 242 and thereby locks the rod 242 in such a manner that it cannot move to the left on its guide means 244, 245 under the action of a spring 243. When the paper carriage reaches such a position, that a lever 232 encounters the control member 230, then the link 235 moves downwardly and releases the rod 242 for left-hand movement by moving the locking lever 236. Hereby a lever 246 on a shaft 247 receives a counter-clockwise rotation and engages a coupling through which an electric motor in known manner can be actuated to restore the paper carriage.

In the machine illustrated, the same electric motor, which also drives the machine, may be used for moving the paper carriage against the action of a paper carriage spring. The paper carriage spring for this purpose may engage a flexible cord 34, Fig. 12, the end of which is anchored on a projecting portion 248 on the paper carriage. The housing for the paper carriage spring may be mounted on an extension of the plate 6, not shown, which plate can be removed with the paper carriage by means of the screws 7.

Paper carriage movement by the drive motor is effected through a flexible cord 249 and a windlass 250 connected to a gear wheel 251 (Figs. 12 and 13). This gear wheel 251 engages a rack 252 on the paper carriage (Fig. 13). By coupling the drive motor with the carriage restoring mechanism by means of a carriage return control member 230, the paper carriage will automatically be returned to the beginning of the line.

In the machine illustrated the arrangement is such that the rack 252 is not rigidly connected to the paper carriage. It is constantly urged to the left, as seen from the front of the machine, by a spring 253 until a rubber cushion 254 on the rack 252 engages the left-hand end of a slot 255 in the base plate 11 of the paper carriage. If the rack 252 is moved to the right by the motor drive, the rubber cushion 254 first moves to the right, the spring 253 stretching until it bears against the right-hand end of the slot 255, whereupon it imparts its movement to the paper carriage.

Before the actual movement of the paper carriage begins the advance projection of the rack 252 by means of the lateral teeth 256 rotates a gear 257. This produces rotation of a shaft 258 and of a pinion 259 engaging lateral teeth in a rod 260. The rod 260 can thus cooperate with a pin 261 (Fig. 2) of an arm 262 which actuates a line spacing wheel (Fig. 2a).

Restoring movement of the paper carriage against its spring tension can also be setted by hand for being effective. For this purpose, a lever 264, Fig. 9, is provided which is under the influence of a key, not shown. When this key is operated, the lever 264 is actuated against the action of a spring 265, the locking lever 236 is released through a pawl 266 on said lever 264 engaging a pin 365, and the carriage restoring movement is rendered operative. After release of the key, the spring 265 will restore the lever 264, the pawl 266 then exerting no influence on the locking lever 236. When the bar 242 is moved to the left, a slot 267 in this bar drives a pin 268 on a bell crank 269 which is rotatable on the shaft 233 and is connected by means of a link 270 to a lever 172. The left-hand movement of the slide 242 will then produce a counter-clockwise rotation of the lever 271 thus the latter coming into the position shown in Fig. 10 in which it cooperates with the control member 272. The control member 272 is preferably set at the beginning of the printing line. When the lever 271 strikes the control member 272 in the direction of the arrow 273, at the beginning of the line, the lever 271 is rotated clockwise and thereby restores the slide 242 through the members 270, 269, 268. The carriage restoring mechanism is then disconnected by means of the coupling lever 246. In the right-hand position of the slide 242, the locking lever 246 can then again be brought into normal position by a spring 239 in which position it locks the slide 242 by the pin 241. By engaging the locking lever 236, the link 235 also is again raised so that at the end of the line it can once more cooperate with a carriage return control member 230.

In a plane offset from the lever 264, the machine illustrated has a second lever 264a (Fig. 11) by means of which a pair of toggle levers 280, 281 (Fig. 9) and the lock lever 236 can be actuated. By operating the lever 264a at first the toggle levers 280, 281 are so operated that the lever 280 bears against the anchoring pin 282 of a spring 283 attached to the bell crank 269. Hereby the bell crank 269 is swung in the clockwise direction and the lever 271 is rotated counter-clockwise a certain amount. Then by the operated lever 264a the locking lever 236 is also swung aside whereby the slide 242 moves to the left and by carrying along with it the supporting pin 284, the bell crank 269 and the lever 271 coupled with it by the link 270 are brought to a higher position than if the toggle levers 280, 281 are not operated. Thus in this setting, in which the parts 280 and 236 come into cooperation, both the carriage movement against the spring is engaged and also the lever 271 is moved upwards to such an extent that it can cooperate

with the less projected stop member 290 (Fig. 11). As a result the paper carriage will finish its counter-spring movement at a more advanced column. In the machine illustrated the arrangement may be such that this simultaneous movement of the parts 280 and 236 may be effected by means of the arm 264a at the end of a machine operation when the line spacing motor key is held depressed during an entire machine operation.

According to the invention, the carriage escapement mechanism is combined structurally with an automatic line spacing mechanism. The line spacing is also derived from the disk 64 for which purpose this disk is provided with an upper projection 315 (Fig. 2) which in the position of rest bears against the bar 316 of a yoke 318 which can rotate about the platen shaft 376. When the disk 64 at the beginning of the machine operation is rotated in clockwise direction, the yoke 318 under the action of a spring, not shown, can follow in counter-clockwise direction and bring a pawl into engagement with the teeth of a ratchet wheel, shown in Fig. 2a. During the return stroke, the upper projection 315 of the disk 64 bears against the bar 316 which extends over the whole width of the paper carriage. Thus the yoke 318 is rotated in clockwise direction, the ratchet pawl of the yoke in known manner advances the ratchet wheel by one tooth or a plurality of teeth.

For obstructing the line spacing in the described manner by engagement of the upper projection 315 of the disk 64 with the bar 316 of the yoke 318 according to Fig. 2 there is provided a pawl 375. This pawl is normally in engagement with the yoke 318 and prevents rotation of the yoke. The pawl is only disengaged if line spacing is by depression of the line spacing key. This automatic line spacing by such machine operations which are to be performed in the same printing line is prevented.

The conditioning of the machine for total taking, sub-total taking, subtraction, non-addition, from the paper carriage, may be in principle effected by providing a carriage actuated mechanism which acts on the same actuating mechanism by means of which the machine can be manually conditioned to the respective mode of operation. Such mechanisms are well known in the art nevertheless by means of an example it will be explained how the balance totalizer 317 may be conditioned for subtraction.

The balance totalizer 317 may, for example, (Fig. 14) be brought into and out of engagement with the rack sector 3, by means of a bracket, which may be of the same form as the control head 130 (Fig. 1). The balance totalizer 317 comprises two sets of wheels journaled in a frame 321 pivoted about a pin 320 (Fig. 14). On the frame there are mounted two pins 322, 323 which are in contact with beveled surfaces 324a, 324b (Fig. 14k) of an actuating slide 324. By downward movement of the actuating slide 324 the totalizer frame 321 is rotated about its pin 320 and moved from the addition position illustrated, into the subtraction position. This shifting is performed in the machine described in such a manner that a conditioning or preparatory movement is first effected by the setting devices, the first machine operation effecting the actual shifting.

The preparatory movement in the machine described is effected by the subtraction key. This key engages a bell crank lever 325 to which is linked a rod 326 (Fig. 14). By depression of the subtraction key the bell crank lever 325 is rotated in counter-clockwise direction thus moving to the left the rod 326 against the action of a spring 335. The right-hand end of the rod 326 is linked to the pin 327 of the lever 336. In pre-setting by means of a subtraction control member 328, a double-armed lever 329 is shifted which rotates a bell crank lever 331 counter-clockwise through a cable 330. This movement is transmitted through a link 332 and a double lever 333 to the pin 327 of the lever 336 whereby the pin is shifted to the left during this pre-setting operation. By this shifting of the pin 327 the lever 336 is rotated clockwise. The lever 336 is provided with two pins 334. The left pin moves a forked lever 337 fulcrumed on a pin 338 and thereby shifts in clockwise direction about its axis 340 an operating member 339. By this rotation of the operating member 339, a shoulder 341 of the operating member 339 is brought below a pin 342 which is provided on a double lever 343, and by means of a link mechanism moved by the pin 141 (Fig. 1) in each addition and subtraction operations of the machine, this double lever 343 is operated in the clockwise direction and subsequently is automatically restored by a spring. Thus the pin 342 encounters the shoulder 341 and thereby shifts downwardly the actuating member 339 and the slide 324 for changing over the totalizer. As shown more in detail in Fig. 14a the rod 326 is jointed by the pin 327 to the lever 336 which rotates about the axis 511. The lever 336 carries two pins 334. Fig. 14b shows the length of the pin 327 and of the pins 334. Against the pin 327 bears the double lever 333 which is connected by means of links 332, bell-crank 331, and link 330, to the setting member 329. The shifting of the lever 336 may take place either by actuation of the bell-crank 325 or by the pull of the rod 326 of the pin 327. The setting lever 336 can also be shifted by the pressure of the double lever 333 on the pin 327. The lever 336 serves to shift the lever 337, Figs. 14c and 14d, by means of the pins 334.

The fork 337 is pivoted at 338 and is connected by means of a pin 512 with the operating member 339, Fig. 14e. By means of the rocking movement of the fork shown in Figs. 14c and 14d, the operating member 339 is shifted into the two positions shown in Figs. 14e and 14f. The shifting of the operating member 339 brings the two shoulders 345 and 341 alternatively into cooperative relation to the pins 346 and 342 of the lever 343 which is pivoted at 510. If the operating member 339 is shifted in clockwise direction by the forked lever 337, so that the shoulder 341 cooperates with the pin 342, then the operating member 339 is shifted downwardly, whereas in the case of shifting counter-clockwise of the member 339 by the fork 337, the shoulder 345 cooperates with the pin 346 of the lever 343 whereby the operating member 339 can be moved upwardly. The described shifting of the member 339 thus serves only to preset according to the nature of calculation required, whereas the machine operation takes care of the setting of the totalizer to this mode of calculation. This setting of the accumulator takes place by the downward or upward movement of the operating member 339 this being effected by means of the shift slide 324, Fig. 14. This slide 324 cooperates with two pins 323 and 322. The upward and downward movements of the shift slide 324 causes the accumulator frame 321 to turn on its

pivot 320 so that either one or the other of the two sets of wheels of the accumulator come into engagement with the driving parts.

If a subtraction is not desired during the next machine operation and for this purpose the spring 335 is made inoperative, the machine in the next operation can be automatically reconditioned for addition. Under the influence of the spring 335, a counter-clockwise rotation of the lever 336 and the clockwise rotation of the forked lever 337 can take place. Thereby the actuating member 339 is rotated in counter-clockwise direction about its fulcrum 340 so that the shoulder 345 is brought above the pin 346 of the double-armed lever 343. Since the shoulder is now in its lower position, during the clockwise rotation of the double lever 343, the actuating member 339 is again raised and the accumulator is re-set for addition. The two positions of the actuating member 339 can be determined by locking means 348.

The invention is obviously not restricted to the machine illustrated and the various possibilities of control herein described. The invention can obviously be applied to many similar modes of construction. In order to avoid the disturbing noise during return of the paper carriage due to striking of the lever 100 on the control members 40, the axis 349 of the lever 100 can be shifted upwards and downwards by a cam 76. The axis 349 of the lever 100 is connected by links 412 jointed at 414 to a double-armed lever co-operating by means of a roller 415 with the cam member 76. A spring 410 attached to the lever 411 causes the roller 415 to bear against the cam 76. The shape of the cam 76 is shown in Fig. 1. On shifting this cam 76, the axis 349 of the lever 100, by action of the lever 411 and the links 412 is lowered on return of the paper carriage, so that all the levers 100 are brought out of contact with the control members 40. The paper carriage can thus move back without disturbing noise. As soon as the next machine operation begins if the paper carriage is in position of rest, the axis 349 is again raised by shifting the cam member 76. Those levers 100, the left ends of which do not encounter control members 40, move upwardly by a considerable amount. The left hand ends of those levers 100 which encounter control members 40 are prevented by the latter performing a further upward movement, so that the right ends of the respective levers 100 to which the cables 103 are attached, are pressed upwardly and actuate the corresponding control members by means of the cables 103. The result is that the machine at the very beginning of the operation is set for the desired working steps.

I claim as my invention:

1. A bookkeeping machine comprising a machine-frame, a paper carriage slidably supported on the machine-frame in two guide tracks spaced from each other in an approximately horizontal plane, setting devices arranged in the said machine-frame in the space between the said guide tracks and controlling various functions of the machine, a plurality of bars removably mounted on the carriage in the space between the guide tracks above the setting devices, and a plurality of groups of control members cooperating with the said setting devices, said bars being of I-shaped cross-section the flanges of which being provided with slots of a width corresponding to the thickness of the control members, and said control members consisting of flat metal plates of which each plate has contact bevels and provided with a slot and the control members of each group being locked on its bar by a rod introduced immediately above the under flange of the bar through corresponding apertures of the control members and being effective in a certain column position of the paper carriage.

2. A bookkeeping machine comprising a machine-frame, a paper carriage slidably supported on the machine-frame in two guide tracks spaced from each other in an approximately horizontal plane, setting devices arranged in the said machine-frame in the space between the said guide tracks and controlling various functions of the machine, a plurality of bars removably mounted on the carriage in the space between the guide tracks above the setting devices, a plurality of groups of control members cooperating with the said setting devices, said bars being of I-shaped cross-section the flanges of which being provided with slots of a width corresponidng to the thickness of the control members, and said control members consisting of flat metal plates of which each plate has contact bevels and provided with a slot and the control members of each group being locked on its bar by a rod introduced immediately above the under flange of the bar through corresponding apertures of the control members and being effective in a certain column position of the paper carriage, a frame removably mounted on the carriage and having front and rear members provided with opposite aligned grooves for reception of the bars, and securing means mounted on the last-named frame for holding the bars in place relatively to the last-named frame.

3. A bookkeeping machine comprising a machine-frame, a paper carriage slidably supported on the machine-frame in two guide tracks spaced from each other in an approximately horizontal plane, setting devices arranged in the said machine-frame in the space between the said guide tracks and controlling various functions of the machine, a plurality of bars removably mounted on the carriage in the space between the guide tracks above the setting devices, a plurality of groups of control members cooperating with the said setting devices, said bars being of I-shaped cross-section the flanges of which being provided with slots of a width corresponding to the thickness of the control members, and said control members consisting of flat metal plates of which each plate has contact bevels and provided with a slot and the control members of each group being locked on its bar by a rod introduced immediately above the under flange of the bar through corresponding apertures of the control members and being effective in a certain column position of the paper carriage, a frame removably mounted on the carriage and having front and rear members provided with opposite aligned grooves for reception of the bars, and a plate covering the last-named frame for securing the bars in place relatively to the last-named frame.

4. A bookkeeping machine comprising a machine-frame, a paper carriage slidably supported on the machine-frame in two guide tracks spaced from each other in an approximately horizontal plane, setting devices arranged in the said machine-frame in the space between the said guide tracks and controlling various functions of the machine, a plurality of bars removably mounted on the carriage in the space between the guide tracks above the setting devices, a plurality of groups of control members cooperating with the said setting devices, said bars being of I-shaped cross-section the flanges of which being provided

with slots of a width corresponding to the thickness of the control members, and said control members consisting of flat metal plates of which each plate has contact bevels and provided with a slot and the control members of each group being locked on its bar by a rod introduced immediately above the under flange of the bar through corresponding apertures of the control members and being effective in a certain column position of the paper carriage, a frame removably mounted on the carriage and having front and rear members provided with opposite aligned grooves for reception of the bars, the bars being I-shaped in cross-section wherein the under flanges of the bars are cut away on the ends of the bars and the width of the grooves of the last-named frame corresponding to the thickness of the center web of the I-shaped bars, and securing means mounted on the last-named frame to hold the bars in place relative thereto.

5. A bookkeeping machine comprising a machine-frame, a paper carriage slidably supported on the machine-frame in two guide tracks spaced from each other in an approximately horizontal plane, setting devices arranged in the said machine-frame in the space between the said guide tracks and controlling various functions of the machine, a plurality of bars removably mounted on the carriage in the space between the guide tracks above the setting devices, a plurality of groups of control members cooperating with the said setting devices, said bars being of I-shaped cross-section the flanges of which being provided with slots of a width corresponding to the thickness of the control members, and said control members consisting of flat metal plates of which each plate has contact bevels and provided with a slot and the control members of each group being locked on its bar by a rod introduced immediately above the under flange of the bar through corresponding apertures of the control members and being effective in a certain column position of the paper carriage, a frame removably mounted on the carriage and having side braces and front and rear members provided with opposite aligned grooves for reception of the bars, and securing means mounted on the last-named frame to hold the bars in place relative thereto, the last-named frame being held in place on the carriage by at least two fastening screws secured in projecting portions of the carriage and the screws having projecting tapered ends entering in counter-sunk bores in side braces of the last-named frame.

6. A bookkeeping machine comprising a machine-frame, a paper carriage slidably supported on the machine-frame in two guide tracks spaced from each other in an approximately horizontal plane, setting devices arranged in the said machine-frame in the space between the said guide tracks and controlling various functions of the machine, a plurality of bars removably mounted on the carriage in the space between the guide tracks above the setting devices, a plurality of groups of control members cooperating with the said setting devices, said bars being of I-shaped cross-section the flanges of which being provided with slots of a width corresponding to the thickness of the control members, and said control members consisting of flat metal plates of which each plate has contact bevels and provided with a slot and the control members of each group being locked on its bar by a rod introduced immediately above the under flange of the bar through corresponding apertures of the control members and being effective in a certain column position of the paper carriage, a frame removably mounted on the carriage and having side braces and front and rear members provided with opposite aligned grooves for reception of the bars, securing means mounted on the last-named frame to hold the bars in place relatively to the last-named frame, and at least two fastening screws secured in projecting portions of the carriage having projecting tapered ends to hold the last-named frame in place on the carriage, said tapered ends of the screws being provided in counter-sunk bores in side braces of the last-named frame and the axes of the fastening screws being slightly displaced in downward direction relatively to the axes of the counter-sunk bores.

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