

Sept. 9, 1941.

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2,255,557

TOTALIZER SELECTING MECHANISM FOR ACCOUNTING MACHINES

Filed June 29, 1939

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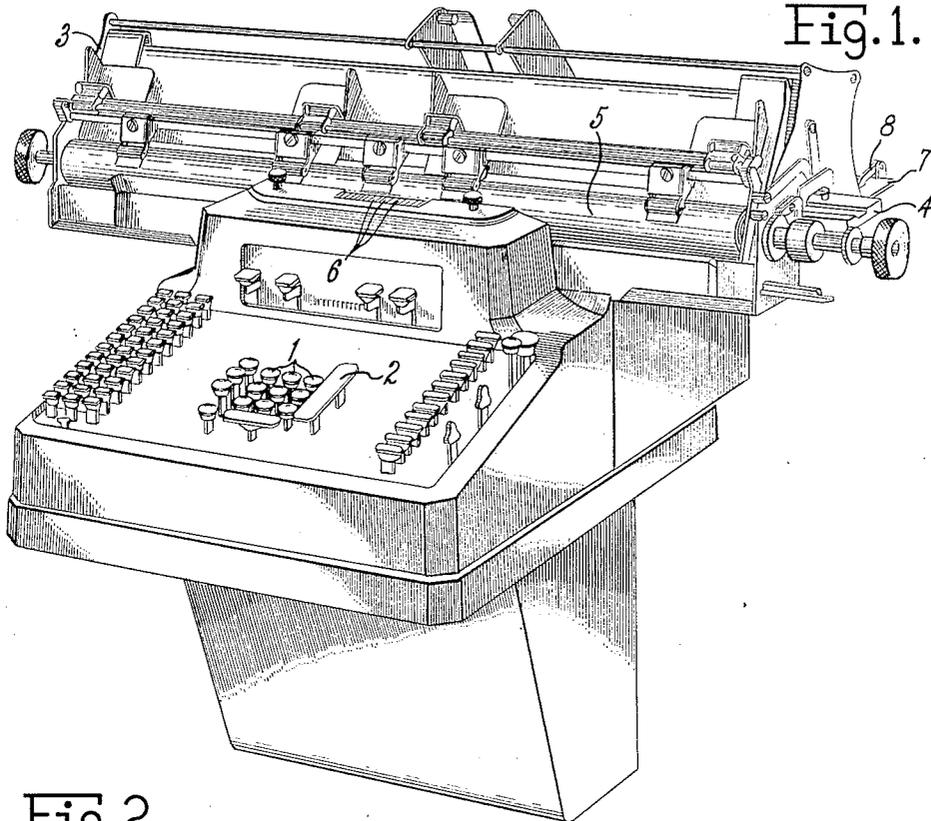
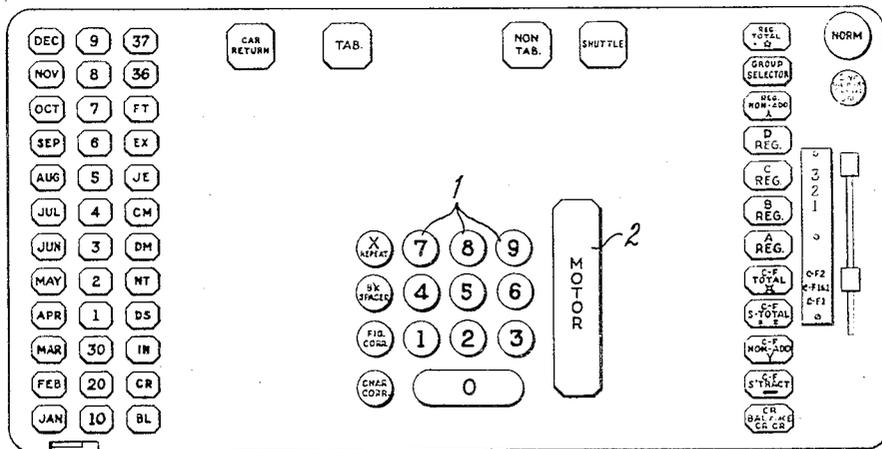


Fig. 2.



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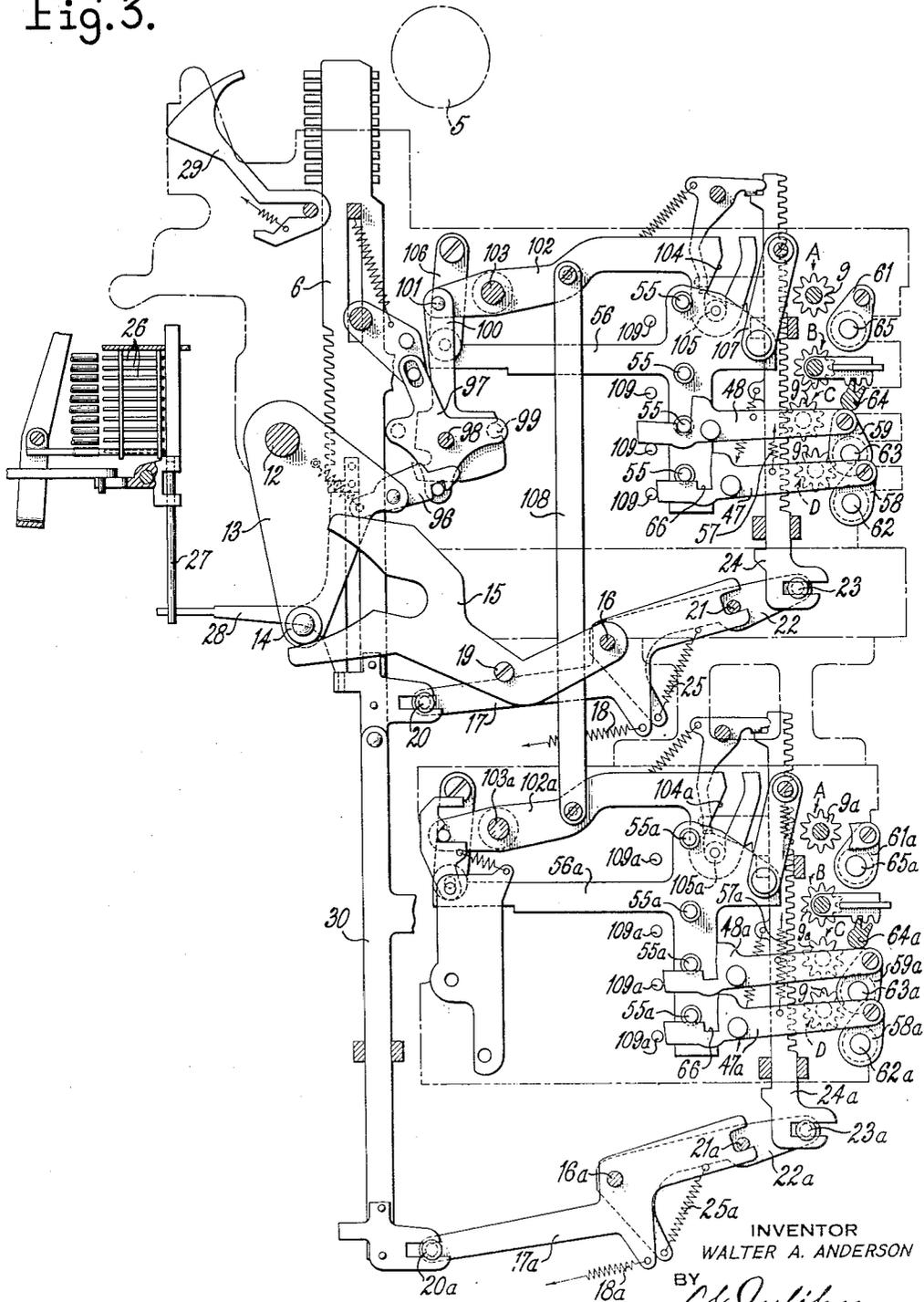
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Fig. 3.



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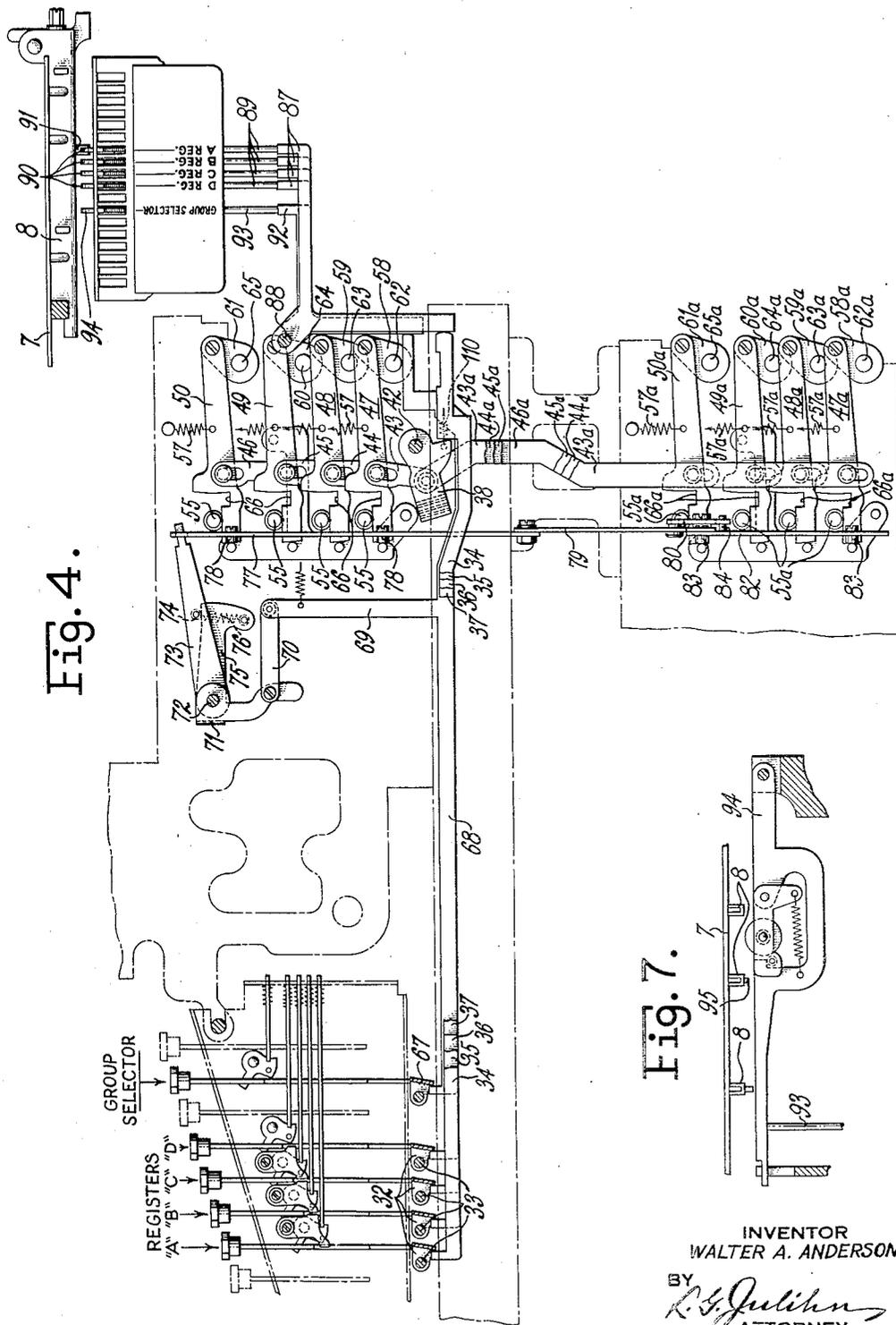


Fig. 4.

Fig. 7.

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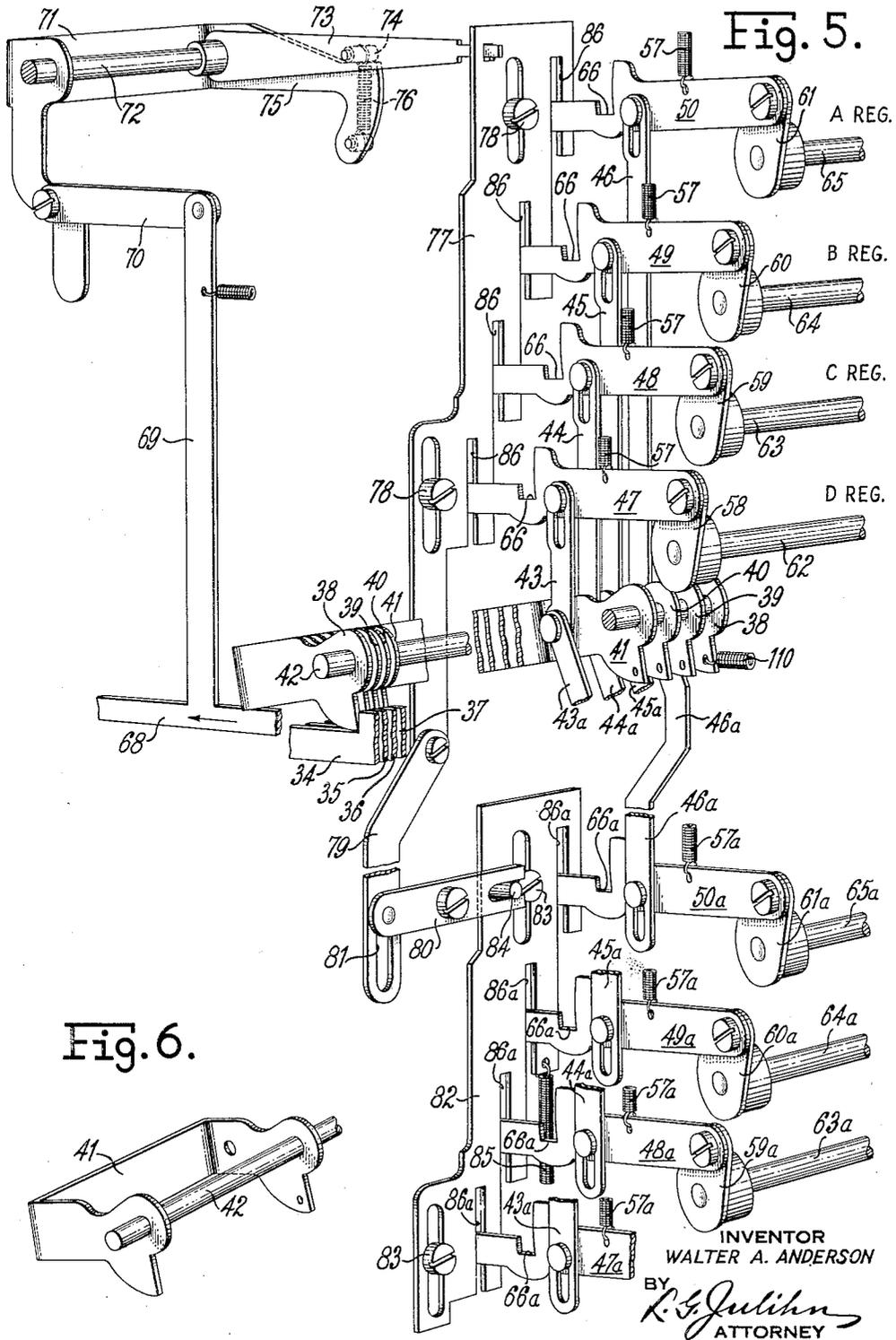
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TOTALIZER SELECTING MECHANISM FOR ACCOUNTING MACHINES

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# UNITED STATES PATENT OFFICE

2,255,557

## TOTALIZER SELECTING MECHANISM FOR ACCOUNTING MACHINES

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Application June 29, 1939, Serial No. 281,773

4 Claims. (Cl. 235—60)

This invention relates to accounting machines of the key set, motor operated type, and more particularly to the controls for the registers thereof.

The primary object of the present invention is to provide a machine having a plurality of groups of adding registers with an automatic register selecting mechanism capable of selecting similar registers of each group jointly, or a particular register of a particular group independently.

Another object of the invention is to provide a register selecting mechanism which is controlled by the paper carriage, and which requires so little power for its operation that it does not materially affect the movement of the carriage in its travel from column to column.

A further object of the invention is to provide a register control mechanism which is simple in design and construction.

With these and incidental objects in view, the invention consists in certain novel features of construction and combinations of parts, the essential elements of which are set forth in appended claims, and a preferred embodiment of which is hereinafter described with reference to the drawings which accompany and form part of the specification.

In the drawings:

Figure 1 is a perspective view of an accounting machine embodying the invention,

Figure 2 is a diagrammatic view of the keyboard,

Figure 3 is a right side elevation showing the adding registers, certain of the controls therefor, the type bars and actuating mechanism,

Figure 4 is a right side elevation showing the mechanism for selecting the registers,

Figure 5 is a perspective of the means for selectively enabling or disabling selection of registers in a particular group,

Figure 6 is a detail perspective of a register selecting ball, and

Figure 7 is a detail rear elevation of the carriage controlled group selector lever.

### GENERAL DESCRIPTION

This machine is an improvement on the application of Oscar J. Sundstrand, Serial No. 581,800, filed December 18, 1931, now Patent No. 2,194,270, and application Serial No. 88,092, filed June 30, 1936, now Patent No. 2,209,240. The machine includes the customary keyboard with amount keys, date keys and operation controlling keys. It has the customary traveling paper carriage that is automatically tabulated from col-

umn to column, and which is automatically returned from a predetermined point in each excursion. The carriage includes a control plate carrying a series of magazines having lugs for automatically controlling the various operations of the machine that are initiated manually by the keyboard. The machine includes eight adding registers and two crossfooters (these latter are omitted from the present illustrations since they have no bearing upon the invention), four registers and one crossfooter being located in what is known as the upper group, and the other four registers and crossfooter being located in what is known as the lower group. All the registers and crossfooters are actuated by a common set of actuators adjustable under control of stops set by the amount indexing keys. These actuators also control the adjustment of type for printing amounts and totals. Each group of registers and each crossfooter has separate sets of transfer elements.

Manual selection of the registers is performed by depression of one of four keys to select a corresponding register in the upper or lower group, and the group in which the desired register is located is selected by non-depression or depression of a fifth key.

Automatic selection of the registers is effected by depression of one of four control levers operable by the paper carriage. Each control lever corresponds to one of the four register selecting keys and is operable to actuate the same mechanism that is operated by its corresponding key. Likewise, a fifth control lever having connection with the same mechanism that is operated by the fifth (group selection) key is operable to automatically select the group in which the desired register is located. Lugs carried in magazines that are mounted at various points on the carriage depress their corresponding control levers as the carriage advances from column to column. When a magazine contains a lug to select a particular register and has no lug in the group selecting position thereof, this particular register is selected in the upper group alone, but when a short lug is placed in the group selecting position of the magazine, this particular register is selected in both the upper and lower groups jointly, while a full length lug in the group selecting position of the magazine selects this particular register in the lower group alone.

Totals are taken from a register by depressing its proper selecting key, operating the machine through a blank cycle, then depressing the register total key and again operating the machine.

Sub-totals are taken from the registers in the same manner as totals, except that the register non-add key is depressed jointly with the register total key.

#### DETAILED DESCRIPTION

##### *Index of topics*

1. The machine sections and actuating mechanism.
2. Registers in general.
3. Manual selection of registers in general.
4. Manual selection of registers in the upper group.
5. Manual selection of registers in the lower group.
6. Automatic selection of registers in general.
7. Automatic selection of registers in the upper group.
8. Automatic selection of similar registers in the upper and lower groups jointly.
9. Automatic selection of registers in the lower group.
10. Engagement of the registers.

##### *1. The machine sections and actuating mechanism*

Referring to Figure 1, the machine includes the customary keyboard having amount keys 1, a motor bar 2, and a paper carriage 3, laterally movable along a track 4. The carriage supports a roller platen 5, around which paper is inserted to be printed upon by type bars 6. A plate 7 fixed on the carriage has a plurality of control magazines 8 for automatically controlling various machine operations as the carriage tabulates from column to column.

The machine also includes (Figure 3) eight adding registers arranged in two groups situated one above the other, there being four registers in each group. They are designated generally A, B, C and D in each group, and each includes a plurality of ten tooth wheels 9. These registers are operable for adding only. Situated in front of these registers are two crossfooters (not shown), each having a plurality of twenty tooth wheels and each being arranged for addition and subtraction. These crossfooters and their operating mechanisms are identical with those disclosed in the before-mentioned Patent No. 2,194,270.

The machine is operated by an actuating shaft 12 that is connected to an electric motor drive in such manner that the shaft is rocked, first counter-clockwise and then clockwise, during each cycle of the machine. The motor (not shown) is started by closing suitable switch mechanism under control of motor bar 2 or a corresponding automatic carriage control lever. Simultaneously, the motor drive is coupled with shaft 12 by suitable clutch mechanism to initiate the above-described oscillatory movement to the shaft.

Two similar arms 13, only one of which is shown, are secured to rock shaft 12, and are each provided with rollers such as 14 that rest in cam slots in the forward ends of two similar arms such as 15, pivoted on a rod 16 and situated on opposite sides of type bars 6. A series of actuating levers such as 17, there being a lever for each type bar, are pivoted on rod 16 between arms 15, and are tensioned clockwise about the rod by springs such as 18, so that the upper edges of the levers rest against a tie rod 19 secured between arms 15. The forward ends of

levers 17 are each pivoted at 20 to their corresponding type bars 6, which are guided for vertical movement in the machine frame. The rear end of each lever 17 is connected by pin-and-slot connection 21 to a bell crank 22, also pivoted on rod 16 adjacent each actuating lever. The rear ends of bell cranks 22 are pivoted at 23 to corresponding register actuating racks 24 guided for vertical movement in the machine frame. Springs such as 25, connected between each bell crank and lever, normally tension the bell cranks counter-clockwise about rod 16 so that the pins of pin-and-slot connections 21 are urged toward the upper edges of the slots for transfer purposes, as described in Patent No. 2,194,270. Identical actuators and racks corresponding to these just described are provided for actuation of the lower group of registers and are designated by like reference numerals with an *a* appended thereto, auxiliary links 30 being connected between actuators 17 and actuators 17*a* to transmit similar movement thereto.

Operation of the machine causes arms 13 and 15 to be raised and lowered during each cycle. As rod 19 rises, during the first half of the cycle, actuators 17 raise such of the type bars as are free to rise under tension of springs 18, and the corresponding actuating racks 24 and 24*a* are simultaneously lowered. As rod 19 descends, during the second half of the cycle, the actuators are restored, restoring the type bars and racks to the normal position shown in Figure 3. The extent of vertical movement of the type bars and racks is controlled by stops 26 that are moved by amount keys 1 (Figure 1) into the path of vertically disposed rods 27, connected to the forward ends of arms 28 of type bars 6. Printing is effected by hammers 29 that are tripped to strike impression type carried by the type bars, shortly after the bars have risen to their fullest extents as determined by the amount indexed on the keyboard.

##### *2. Registers in general*

The eight adding registers are each composed of a number of ten tooth wheels engageable with actuating racks 24 and 24*a* for their operation. The four registers in the upper group are provided with one set of transfer elements, and the four in the lower group with another set. The transfer elements for each set are identical, and the registers and transfer elements are identical with those shown in the Sundstrand Patent No. 2,194,270, and, therefore, will not be described in detail.

##### *3. Manual selection of registers in general*

Referring to Figures 1 and 4, the row of wide top keys at the right hand side of the keyboard includes four keys designated A register, B register, C register and D register. Depression of one of these keys results in the selection of the adding register corresponding to the key depressed. Referring particularly to Figure 4, four bails 32 are pivoted on rods 33 and lie directly beneath the stems of the keys for selecting the A, B, C and D registers. These bails have their lower portions lying directly behind upstanding portions of slides 34 to 37 extending to the rear of the machine. At their rear ends, the slides 34 to 37 have upwardly extending portions lying directly behind downwardly extending shoulders on bails 38 to 41 (Figures 5 and 6) pivoted on a rod 42. At the opposite sides, the bails 38 to 41 have pivoted thereto four links 43 to 46, which in

turn are pivoted to four engaging links 47 to 50. As shown in Figures 4 and 5, there is a pin-and-slot connection between links 43 to 46 and the engaging links 47 to 50 to provide for a movement of any of the links 43 to 46 without a corresponding movement of the engaging links. Four depending links 43a to 46a are also pivoted to the bails 38 to 41 respectively, on the same pivot studs as the links 43 to 46. Links 43a to 46a are connected at their lower ends by pin-and-slot connections to four engaging links 47a to 50a for the registers in the lower group.

By the train of connections just described, depression of one of the register selecting keys A to D oscillates one of the bails 32 clockwise and moves one of the slides 34 to 37 forward. This rotates the corresponding bail 38 to 41 clockwise, and raises the corresponding set of links 43, 43a to 46, 46a. Stud 55 and 55a (Figures 3 and 4) secured in members 56 and 56a respectively, for the upper and lower groups, lie immediately above the forward ends of engaging links 47 to 50 and 47a to 50a. The members 56 and 56a are held against vertical movement in a manner to be later explained. Springs 57 and 57a (Figures 4 and 5), connected to the engaging links and to the machine frame, hold the forward ends of the links up against the upper ends of the slots in links 43 to 46 and 43a to 46a. The rear ends of the engaging links are pivoted to levers 58 to 61 and 58a to 61a, which in turn are secured to shafts 62 to 65 and 62a to 65a.

From this construction, it is seen that when one set of links 43, 43a to 46, 46a are raised by depression of their register selecting keys, the corresponding engaging links will be free to move up a short distance under the tension of their corresponding springs 57 when the corresponding studs 55 are moved into alignment with notches 66 and 66a in the upper and lower engaging links respectively. Stud 55 and 55a are so moved by the register engaging mechanism later to be explained.

#### 4. Manual selection of registers in the upper group

In order to make it possible to select a register in the upper group to the exclusion of the corresponding register A to D in the lower group, the following mechanism is provided.

A bail 67 (Figure 4) situated under the stem of a group selector key is pivoted similarly to balls 32. A slide 68 is situated similarly to slides 34 to 37 and adapted for similar movement. An arm 69 extends upwardly from slide 68 and is connected by a link 70 to a bail 71 pivoted on a rod 72. An arm 73, also pivoted on rod 72, has a stud 74 projecting laterally therefrom and lying over the rear end of an arm 75 of bail 71. A spring 76 is connected to stud 74 and to a stud on arm 75. A slide 77 (see also Figure 5), mounted for vertical reciprocation on stationary studs 78, has a small opening in its upper end to receive the rear end of arm 73. A link 79, pivoted to slide 77, is connected at its lower end to a lever 80 by a pin-and-slot connection 81. A slide 82, similar to slide 77, is likewise mounted for vertical movement on stationary studs 83. A stud 84 on slide 82 is embraced by a bifurcated end of lever 80. A strong spring 85 is connected to slide 82 and to the machine frame. Slides 77 and 82 each have four slots 86 and 86a respectively, embracing the forward ends of the engaging links 47 to 50 and 47a to 50a.

When the parts are in their normal positions,

as shown in Figure 4, and assuming that no register in either group was selected during the last operation, the upper ends of the slots 86 (Figure 5) lie a sufficient distance above the forward ends of their respective engaging links 47 to 50 to allow a selected one of these engaging links to rise during the operation for the purpose of engaging its register with the actuating racks, as hereinafter described. The upper ends of the four slots 86a, however, lie in contact with the upper surfaces of the forward ends of their corresponding links 47a to 50a and are held in this position by tension of spring 85. With the parts in this position, depression of one of the register selecting keys, and the accompanying raising of its corresponding set of links 43, 43a, etc., releases the corresponding set of engaging links 47, 47a, etc., to the lifting action of the corresponding springs 57, 57a, but only the upper engaging link is free to rise and engage its corresponding stud 55, since slide 82 restrains the lower link through the superior strength of spring 85 over spring 57a. In this manner a register in the upper group is selected for independent operation.

#### 5. Manual selection of registers in the lower group

When it is desired to select one of the registers A to D in the lower group, its corresponding key is depressed, raising the corresponding set of links 43, 43a to 46, 46a as above described. In addition to this, the group selector key is depressed. This pulls slide 68 forward, rocking bail 71 and arm 73 clockwise about rod 72, moving the upper ends of slots 86 downwardly into contact with the forward ends of the upper engaging links 47 to 50, and simultaneously pivoting lever 80 to raise slide 82 and the upper ends of slots 86a upwardly away from the lower engaging links 47a to 50a. Now, upon operation of the machine, the upper engaging link of the selected register is restrained from engaging its corresponding stud 55, whereas the lower engaging link for the selected register is free to rise and engage its corresponding stud 55a. In this manner, a register in the lower group may be selected for independent operation.

#### 6. Automatic selection of registers in general

The registers may be automatically selected under the control of the traveling paper carriage 3. The mechanism for controlling automatic selection of the registers is so arranged that a particular register of the upper group may be selected to the exclusion of the corresponding register in the lower group, or vice versa, or the corresponding registers in the two groups may be selected jointly.

This mechanism comprises a series of bell cranks 87 (Figure 4) pivoted on a stationary rod 88, there being one such bell crank for each slide 34 to 37. These bell cranks have depending arms resting against the rear ends of their corresponding slides 34 to 37, and horizontal arms upon which rest rods 89, suitably guided for vertical movement. The upper ends of rods 89 lie directly beneath control levers 90 (similar to control lever 94, Figure 7) that are pivoted in the machine frame. Lugs such as 91 (Figure 4), placed in certain of the magazines 8 that are located in predetermined columns, depress their corresponding control levers 90 when the carriage advances to these columns. Depression of a lever 90 rocks its corresponding bell crank

87 clockwise to thrust the corresponding slide 34 to 37 forward the same as when its corresponding key A to D is depressed to pull the slide forward.

A bell crank 92, similar to bell cranks 87 and also pivoted on rod 88, has a depending arm resting against the rear end of slide 68, and likewise has a horizontal arm supporting a rod 93, similar to rods 89, that lies beneath a control lever 94 (see also Figure 7) for automatically controlling the selection of the group in which the desired register is located. A lug placed in a magazine 8 in the group selector position there-of depresses lever 94 to thrust slide 68 forward the same as though the group selector key were depressed to pull this slide forward.

#### 7. Automatic selection of registers in the upper group

When a magazine 8 in a particular column on the control plate 7 contains a lug to select a particular register A to D, and this magazine has no lug in the group selecting position thereof, that particular register of the upper group is selected, since slide 68 is not moved forward and the operation is the same as explained in connection with manual selection of registers in the upper group.

#### 8. Automatic selection of similar registers in the upper and lower groups jointly

When a magazine 8 contains a lug to select a particular register, and also contains a short lug 95 (Figure 7) in a group selector position of this magazine, as the carriage moves into this column the proper control lever 90 is depressed to raise the corresponding set of links 43, 43a to 46, 46a of this particular register, and control lever 94 is simultaneously partially depressed to thrust slide 68 forward one half the amount of its full movement. As shown in Figure 5, such partial movement of slide 68 is sufficient to rock arm 73 enough to raise the upper ends of slots 86a upwardly away from lower engaging links 47a to 50a, but is insufficient to lower the upper ends of slots 86 into contact with upper engaging links 47 to 50. Therefore, the engaging links of both groups are permitted to rise and engage their corresponding studs 55 and 55a, thus effecting a joint selection of similar registers in each group.

#### 9. Automatic selection of registers in the lower group

When a magazine contains a lug to select a particular register, and has also a full length lug in the group selecting position thereof, when the carriage moves into this column, control lever 94 is fully depressed, to thrust slide 68 forward its full distance of travel, the same as when the group selecting key is depressed to pull the slide forward. This moves slides 77 and 82 to the same positions that they occupy when the group selector key is depressed, i. e., with the upper ends of slots 86 against engaging links 47 to 50 and the upper ends of slots 86a removed from engaging links 47a to 50a. Hence, the desired register is automatically selected in the lower group along, as described in connection with manual selection of registers in the lower group.

#### 10. Engagement of the registers

Engagement and disengagement of the registers with the actuating racks is accomplished by

mechanism identical with that disclosed in the before-mentioned Patent No. 2,209,240. A summary description of this mechanism is herein given only insofar as it pertains to the operation of the present invention.

As before stated, rock shaft 12 and arms 13 (Figure 3) are rocked first counter-clockwise, and then clockwise, about 90° during each cycle of the machine. The right arm 13 has pivoted thereto a pawl 96, that oscillates a plate 97 pivoted on a stationary stud 98, first counter-clockwise, then clockwise, during each cycle of the machine. Plate 97 carries a stud 99 engaging a notch in the rear edge of a pendant 100 during accumulating operations. Pendant 100 is pivoted at 101 to a cam lever 102 pivoted on a stationary rod 103. The rear end of lever 102 has a cam slot 104 embracing a stud 105 on member 56. This member is suspended for reciprocal horizontal movement on two links 106 and 107, pivoted to the front and rear ends of member 56 and to the machine frame. As heretofore mentioned, studs 55 are secured in member 56 to move forwardly and rearwardly of the machine with the member.

With the exception of pawl 96, plate 97 and pendant 100, duplicate parts identical with those just described, are provided for engaging the lower group of registers, and are designated by like reference numerals having an *a* appended thereto, cam lever 102a being connected for parallel and uniform movement with cam lever 102 by a link 108.

When the machine begins an operation, counter-clockwise movement of plate 97 raises pendant 100 and lowers the rear ends of levers 102 and 102a. This causes cam slots 104 and 104a to shift members 56 and 56a, respectively, to the rear so that any engaging links 47, 47a to 50, 50a that are free to rise under the tension of springs 57, may do so as soon as the corresponding studs 55, 55a reach their rearmost positions in line with their corresponding notches 66 and 66a. The raising of an engaging link causes its forward end to lie above a corresponding stud 109 or 109a, the latter being stationary in the machine frame.

At the beginning of the return or clockwise oscillation of the plate 97, the pendant 100 is lowered, and the rear ends of cam levers 102 and 102a are raised to move members 56 and 56a to the left. Since the selected one of the engaging links in either the upper or lower, or both groups, is now in its upper position, the forward movement of members 56 and 56a pulls such engaged links forward. The front end of an engaged link will now rest above its corresponding stud 109 or 109a. The forward position of an engaging link is illustrated by the engaging link for the C register in the upper group in Figure 3. This forward movement of the engaging link oscillates its corresponding arm 58, 58a to 61, 61a and shaft 62, 62a to 65, 65a (Figure 5) counter-clockwise. Referring to Figure 3, it is seen that oscillation of one of the shafts 62 to 65 or 62a to 65a engages its corresponding register A to D with actuating racks 24 or 24a.

At the completion of the cycle, such of the engaging links as have been engaged with either studs 55 or 55a, or both, remain engaged. If, at the beginning of the next operation, the register engaged for the last operation is not selected, the initial counter-clockwise movement of plate 97 disengages such register by movement of its engaging link to the rear. As soon as the en-

gaging link reaches its rearmost position, one of four strong springs such as 110 (Figure 5), attached to each bail 38 to 41 and to the machine frame, pulls its corresponding bail counter-clockwise about pivot 42. At this time, the bail is free to be rocked in this direction since its corresponding slide 34 to 37 is not moved forward during this operation by depression of either its corresponding register key or automatic control lever 90.

In the event that one of the registers in the upper group, for instance the C register, was selected during the last operation, its engaging link is left in position above stud 109, as shown in Figure 3, blocking downward movement of slide 77. Now, if a register in the lower group is selected for engagement during the next operation, upon depression of the group selector key or automatic control lever 94, spring 76 (Figure 5) yields to permit actuation of the connected parts, and places clockwise tension on arm 73. At the beginning of the ensuing cycle, when the C register is disengaged in the manner previously described, slide 77 is immediately lowered under tension of spring 76 to disable selection of upper group registers, and slide 82 is simultaneously raised to enable selection of the proper register in the lower group. This is possible because of the superiority of the spring 76 over spring 85.

Near the end of a machine cycle during which a lower register is engaged, the automatic release of the group selector key or the automatic tabulation of the carriage to the next columnar position (depending upon which means was used to select the register) permits slide 68 to be restored to its rear position. This raises slide 77 and link 79, but since the forward end of one of the engaging links 47a to 50a at this time lies above its stud 109a, slide 82 is prevented from returning to its lower position. This movement of slide 77 without a corresponding movement of slide 82 is permitted by the pin-and-slot connection 81.

If, during the next cycle, no register is selected from the lower group, the initial counter-clockwise movement of plate 97, in restoring the engaging link 47a to 50a associated with the engaged lower register, allows spring 85 to restore slide 82 to its normal position.

While the form of mechanism herein shown and described is admirably adapted to fulfill the objects primarily stated, it is to be understood that it is not intended to confine the invention to the one form of embodiment herein disclosed, for it is susceptible of embodiment in various forms, all coming within the scope of the claims which follow.

What is claimed is:

1. In a machine of the class described, two

groups of totalizers, a traveling carriage, a plurality of trains of elements equal in number to the totalizers in one group and controlled by the carriage for selecting the totalizers in both groups, and another train of elements controlled by the carriage for preventing the selection of totalizers in one or the other groups, or enabling the selection of totalizers in both groups.

2. In a machine of the class described, a plurality of groups of totalizers, actuators therefor, a traveling carriage, engaging means for meshing the totalizers with the actuators, separate means for connecting each totalizer with the engaging means, means in each group for preventing or enabling such connection of any totalizer in that group, and means for setting the disabling and enabling means to enable connection of a totalizer in one group only, to enable connection of a totalizer in each group jointly, or to enable connection of a totalizer in the other group only, and means on the carriage to control the operation of the setting means.

3. In a machine of the class described, two groups of totalizers, actuators therefor, a traveling carriage, means for engaging the totalizers with the actuators, individual engaging links for connecting the totalizers with the engaging means, links connected with the engaging links for controlling the engagement of the engaging links with the engaging means and operable by the traveling carriage, and additional means operable by the traveling carriage and including a pair of plates for controlling the engagement of the engaging links with the engaging means, one of the plates operating in connection with the engaging links for the totalizers of one group and the other with the engaging links for the totalizer of the other group, and means for so connecting the two plates with each other that either plate may lie in ineffective position alone, or both may lie in ineffective position jointly.

4. In a machine of the class described, two groups of totalizers, actuators therefor, means for engaging the totalizers with the actuators, a separate means for each group for rendering the engaging means for its respective group ineffective, means operated by the traveling carriage for operating said separate means, and means to coordinate the movements of said separate means, the said coordinating means being effective to move one of the separate means to ineffective position when the carriage operated means is moved to one position, to move the other separate means to ineffective position when the carriage operated means is moved to a second position, and to move both the separate means to ineffective position when the carriage operated means is moved to a third position.

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