

May 4, 1926.

1,583,102

O. J. SUNDSTRAND

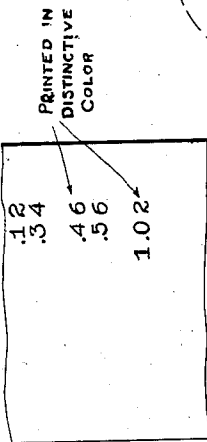
ADDING AND LISTING MACHINE

Filed Sept. 13, 1920

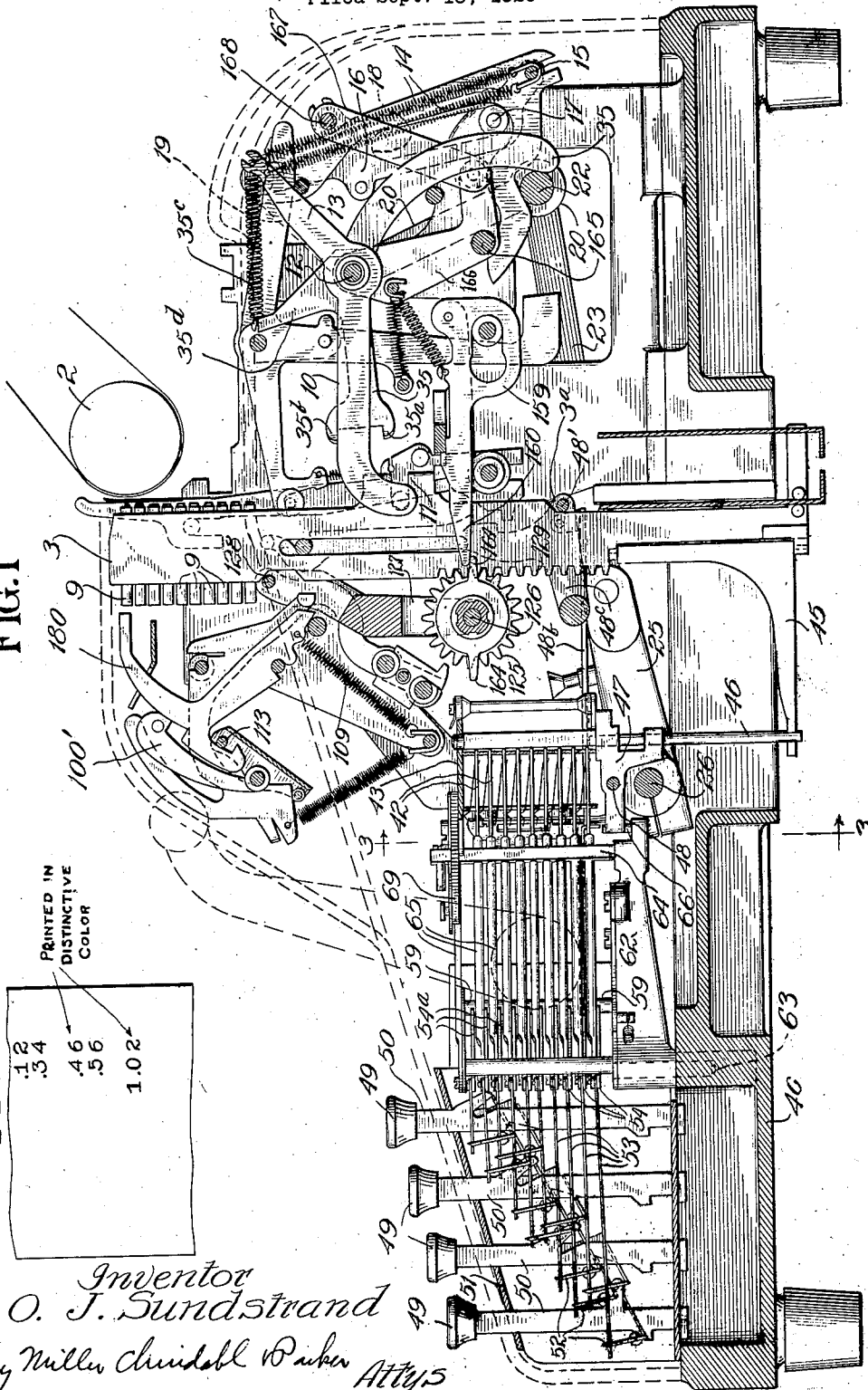
3 Sheets-Sheet 1

FIG. 1

FIG. 1^a



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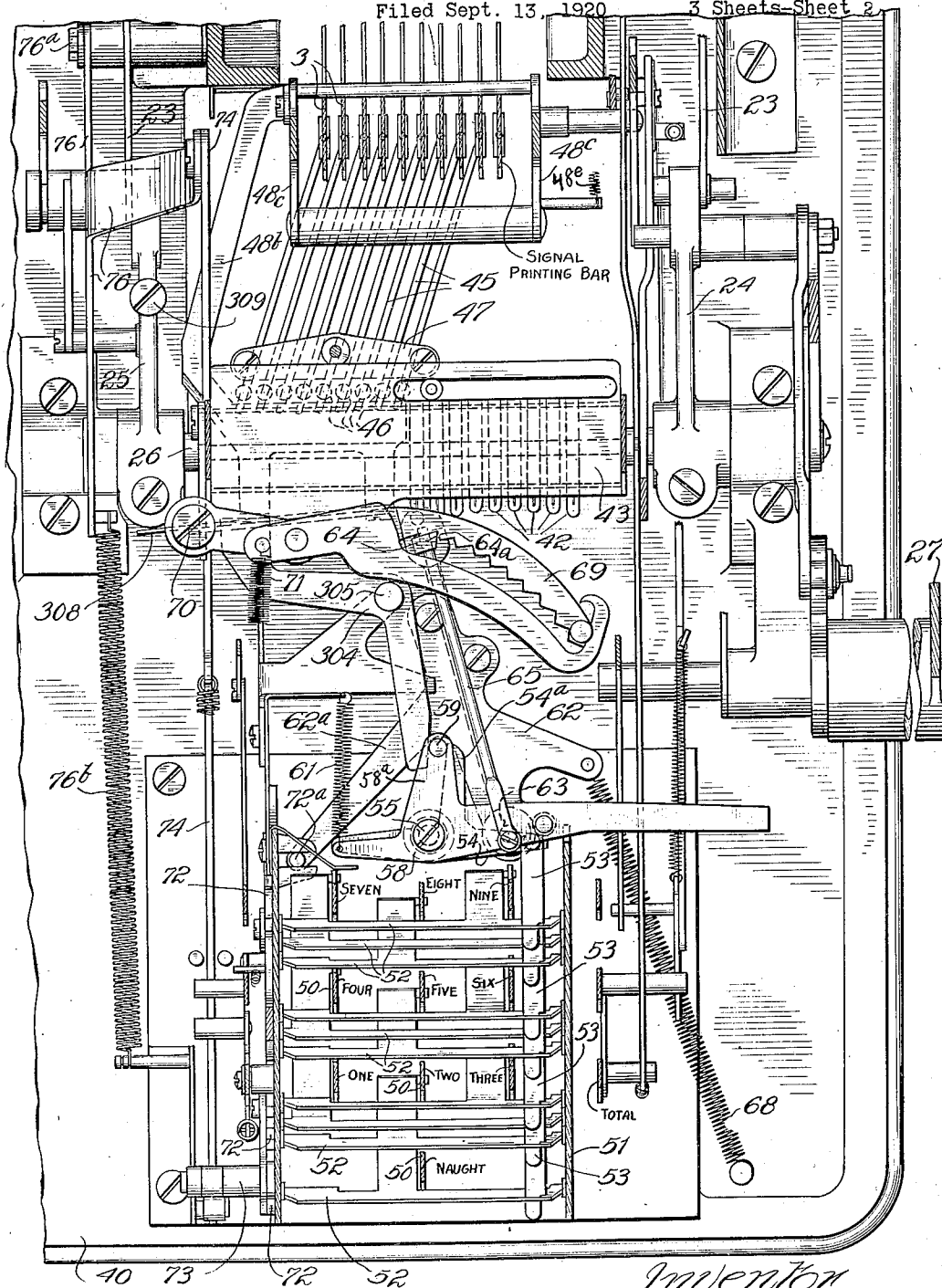


FIG. 2

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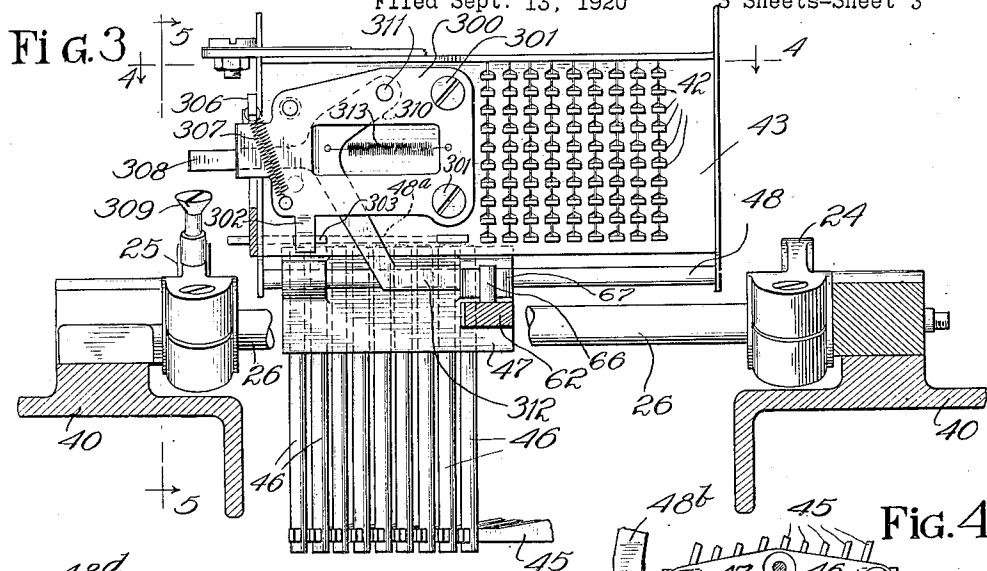
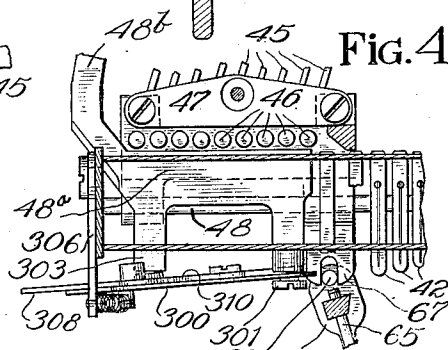
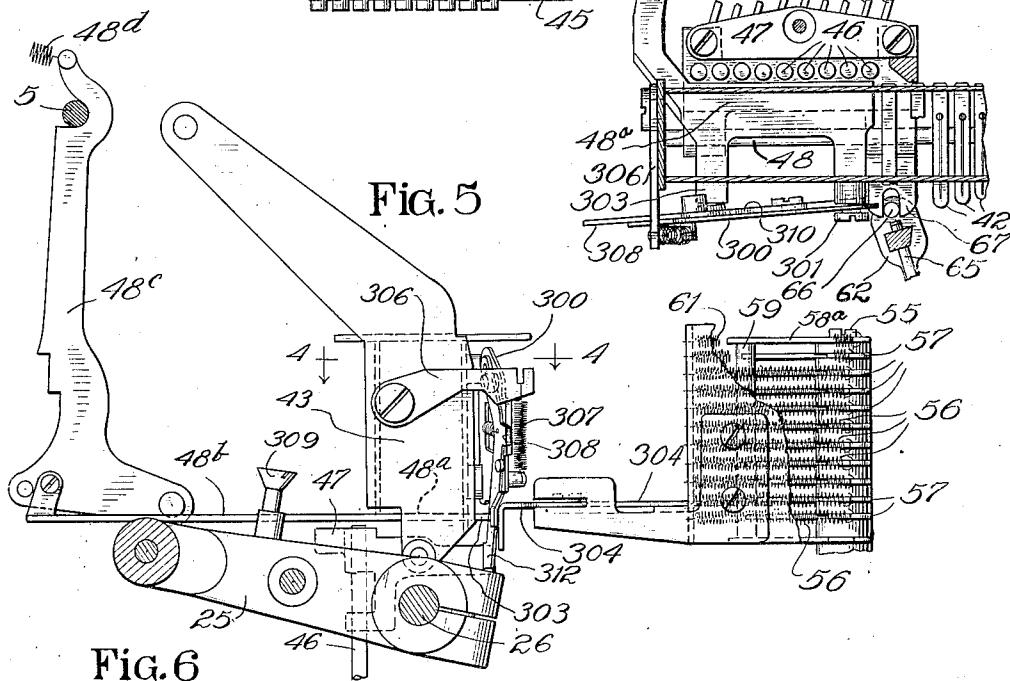
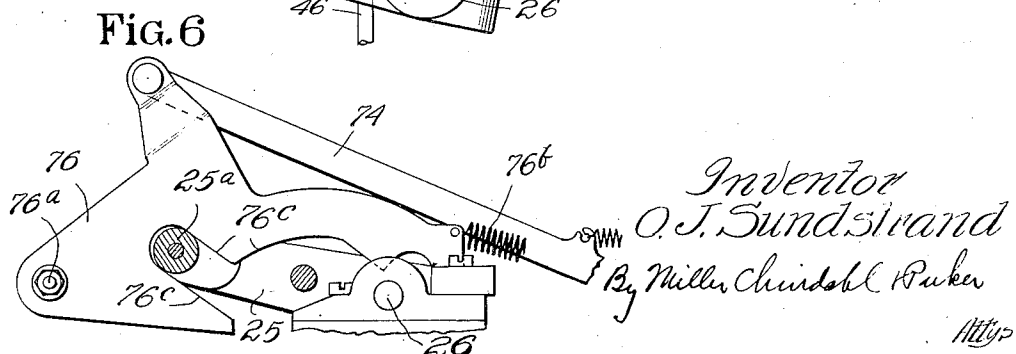
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ADDING AND LISTING MACHINE

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3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE.

OSCAR J. SUNDSTRAND, OF ROCKFORD, ILLINOIS, ASSIGNOR TO ROCKFORD MILLING MACHINE COMPANY, OF ROCKFORD, ILLINOIS, A CORPORATION OF ILLINOIS.

ADDING AND LISTING MACHINE.

Application filed September 13, 1920. Serial No. 409,778.

To all whom it may concern:

Be it known that I, OSCAR J. SUNDSTRAND, a citizen of the United States, residing at Rockford, in the county of Winnebago and State of Illinois, have invented certain new and useful Improvements in Adding and Listing Machines, of which the following is a specification.

For convenience in affording an understanding of the invention I shall describe the same as applied to or embodied in the ten-key adding machine disclosed in Patent No. 1,198,487, granted September 19, 1916, to Rockford Milling Machine Company upon an application filed by Gustaf David Sundstrand, but I would have it understood that the present invention is not limited to machines of the general character illustrated in said patent.

In the Sundstrand machine, when an amount is to be carried from one order to the next higher order the element of the carrying mechanism which is associated with the rack or type bar corresponding to such higher order is withdrawn, thereby allowing that bar to descend to an extent which is just sufficient to turn the adding pinion for that rack or type bar through the distance of one tooth. Said carrying element is not restored to its normal position until the operating handle is again pulled forward. While the carrying element is in such withdrawn position it is not in position to cooperate with the corresponding adding pinion and hence it is impracticable to print a total while the carrying element is in such withdrawn position. Means is therefore provided in the Sundstrand machine for preventing any of the racks or type bars from rising out of their normal position when an attempt is made to obtain a subtotal or a final total while any one of the above-mentioned carrying elements is in its withdrawn position. The operation of the handle therefore imparts no material upward movement to any of the racks or type bars except the bar that was below its normal position, the last-mentioned bar being moved up to its normal position, the corresponding carrying element being restored to its normal position, and

the platen being turned through one space through the line-space mechanism. Such a stroke of the handle is commonly termed a blank or spacing stroke.

It will thus be seen that when the last item accumulated has necessitated carrying from one order to a higher order, a spacing stroke of the handle is necessary before a subtotal or a final total can be taken. When, however, the item last added does not necessitate carrying, a subtotal or a final total may be taken without a spacing stroke of the handle. For the sake of uniformity in actuation and uniformity in the appearance of the work, it is desirable that the operation of taking totals shall not be varied on account of carrying operations. It is, therefore, one of the objects of this invention to attain the desirable result just stated. In the present embodiment of the invention this improved result is obtained by means which compels a spacing stroke prior to the taking of a total regardless of whether carrying was necessitated in the accumulation of the last item.

In the accompanying drawings, Figure 1 is a longitudinal vertical sectional view of the embodiment selected to illustrate the invention. Fig. 1^a illustrates a specimen of the work done on the machine. Fig. 2 is a fragmental horizontal sectional view. Fig. 3 is a section on line 3—3 of Fig. 1. Fig. 4 is a section on line 4—4 of Fig. 3. Fig. 5 is a section on line 5—5 of Fig. 3. Fig. 6 illustrates a portion of the means for restoring the setting-up mechanism.

Without intending to limit the invention to machines of any particular type or character, I have herein illustrated a machine comprising a platen 2 and vertically reciprocatory type bars 3. Each bar 3 is provided at its upper end with ten type-carrying plungers adapted to print from naught to nine respectively. The top plunger is adapted to print "0", the next to the top "1" and so on. The bars 3 are normally in position to print ciphers. The means for vertically moving each bar 3 from the cipher-printing position to any other selected position and back again comprises an arm 10 carrying a roller that lies in a

notch 11 in the bar. The arm 10 is loosely mounted on a fixed shaft 12. Rigid with the arm 10 is an arm 13 which is yieldingly connected through a pair of coiled springs 14 to a rod 15. The latter is carried by two side members 16 which are guided for approximately vertical movement by roller studs 17, said studs lying in elongated openings 18 in the side members 16. Pivoted to the upper ends of the side members 16 are arms 19 which are pivotally mounted on the shaft 12. Rigid with the arms 19 are two arms 20 which carry a rod 22. The end portions of the rod 22 are connected through two links 23 to two crank arms 24 and 25 fixed on the main rock shaft 26. The shaft 26 is arranged to be rocked by means of a handle 27 connected in any suitable manner to the arm 24. When the operator pulls the handle forward the crank arms 24 and 25 are caused to swing upwardly, thereby drawing the rod 22 forward and moving the side members 16 and the rod 15 downwardly. The movement of the rod 15 is yieldingly transmitted through the springs 14 and the arms 13 and 10 to such of the bars 3 as are at liberty to rise. When the operator releases the handle on the completion of the forward stroke, means of any ordinary or suitable character returns the handle to its normal position as shown in dotted lines in Fig. 1. The means for moving down those bars 3 which were raised in the forward stroke of the handle comprises levers 35 pivotally mounted on the shaft 12, there being one such lever for each bar 3. Rigid with each lever 35 are two lugs 35^a and 35^b adapted to bear against opposite sides of the adjacent arm 10. A spring 35^c tends to hold the lug 35^a in contact with the arm 10. The spring 35^c extends between the arm 13 and an arm 35^d rigid with the lever 35. During the back stroke of the handle the rod 22 is moved against those levers 35 which are associated with the bars 3 that were raised in the forward stroke of the handle. When the rod 22 moves the lower ends of the levers 35 rearwardly, the spring 35^c or the lug 35^b restores the bars 3 to their initial (lower) position.

The means for limiting the extent to which the bars 3 may rise and thus to determine which numerals shall be brought to the printing position comprises a group of stops 42, each stop being horizontally slidable in a forward and back direction in a stationary guide frame 43. When moved rearwardly from the position shown in Fig. 1 the stops are in the path of movement of devices carried by the bars 3 and thereby limit the upward movement of said bars. These devices consist of arms 45 pivoted to the lower portions of the bars 3 and pins 46 having openings through which the arms 45 extend. The pins 46 are guided for ver-

tical movement in a slide 47 which is mounted on a stationary guide rod 48 extending transversely of the machine. The guide rod 48 is so positioned with respect to the guide frame 43 that the slide 47 is movable to carry the pins 46 from their normal or initial position at the left-hand side of the group of stops 42 into vertical alignment with the columns of stops.

Those bars 3 which are not needed in accumulating or printing a given item are prevented from rising when the handle is pulled forward, by a detent plate 48^a (Fig. 4) guided to move in a horizontal plane, said plate being connected through a bar 48^b to a frame 48^c (Figs. 2 and 5). The frame 48^c is mounted to swing on the axis of a rod 5 and is normally impelled forward by springs 48^d.

The means for projecting the stops 42 into the vertical path of movement of the pins 46 comprises a plurality of keys 49 which are numbered from 0 to 9, as indicated in Fig. 2. The stems 50 of the keys are mounted for vertical movement in a guide frame 51 located on the forward end of the base 40. Each key is arranged to tilt a sheet-metal member 52 pivoted in the frame 51, said member being virtually a bell-crank lever. One arm of each of said bell-crank levers bears against the front end of a link 53 the rear end of which is pivoted to the arm 54 of a lever pivoted on the axis 55 (Fig. 2). A contractile spring 56 (Fig. 5) connected to the arm 57 of the last-mentioned lever serves to restore the corresponding key to its normal position after a depression thereof. 58 (Fig. 2) is a lever pivoted on the axis 55. To the arm 58^a of said lever is fixed a vertical universal rod 59 (Figs. 2 and 5). A contractile spring 61 normally holds the universal rod 59 in contact with arms 54^a which are rigid with the arms 54.

A bracket 62 is pivoted on the center indicated at 63 in Figs. 1 and 2 and carries a post 64 in which are slidably supported the rear ends of ten push pins 65. The forward end of each push pin 65 except the uppermost one is pivoted to one of the arms 54 (the arms 54 corresponding to the keys numbered 0 to 8 inclusive). The uppermost push pin 65 is pivoted to the lever 58. The push pins 65 are arranged in a vertical row or column and all except the uppermost push pin are adapted to push the stops 42 out of the position shown in Fig. 1 and into the path of the upward movement of the pins 46.

The slide 47 is caused to move in unison with the bracket 62 by means of a pin 66 fixed to the bracket and lying within the bifurcation of a lug 67 on the slide. As the operator sets up an item on the keyboard, the slide 47 and the bracket 62 are moved from one vertical row of stops 42 to the

next adjacent row as each number key is depressed and restored. The series of push pins 65 normally stands in front of the vertical row of stops which is farthest to the left, and is moved to successive vertical rows of stops as the setting up of the item progresses. The series of pins 46 is moved from left to right, step by step,—one step for each numerical order in the item being set up—thereby bringing the necessary number of pins 46 into vertical alinement with the stops 42 that have been set by the push pins 65.

The slide 47 and the bracket 62 are moved to the right by a contractile spring 68. The spring is controlled by an escapement consisting of the uppermost push pin 65, a tooth 64^a formed on the upper end of the post 64, and a curved ratchet bar 69 pivoted to the framework at 70, the ratchet bar being yieldingly held against the topmost push pin 65 or the tooth 64^a by means including a contractile spring 71. The top lever 58 being connected to the universal rod 59, the top push pin 65 will be moved whenever any one of the keys 49 is depressed. When the top push pin 65 pushes a tooth of the ratchet bar 69 clear of the tooth 64^a, the spring 68 pulls the slide 47 and the bracket 62 to the right until the push pin stops against the said tooth of the ratchet bar. When the operator lifts his finger from the key 49, the top push pin 65 is withdrawn from said ratchet-bar tooth by the spring 61; and the spring 68 pulls the slide 47 and the bracket 62 farther to the right until the tooth 64^a stops against the next tooth of the ratchet bar. The slide 47 and the bracket 62 are moved to the left into the initial position by means comprising a slide bar 72 (Fig. 2) which has a pin-and-slot connection at 72^a with the arm 62^a of the bracket 62. On the forward end of the bar 72 is a roller stud 73 (Fig. 2). A bar 74 (Fig. 6) is guided for movement alongside the bar 72. The rear end of the bar 74 is pivoted to one arm of a lever 76 which is pivoted to the framework at 76^a. A spring 76^b connected to the lever 76 tends to move the bar 74 forwardly into the position shown in Fig. 2. On the arm 25 is a roller stud 25^a that operates upon a cam surface 76^c on the lever 76. In the setting up of an item, the slide bar 72 moves rearwardly. When the handle 27 is pulled forward, the roller stud 25^a causes the lever 76 to swing upwardly, thus drawing the bar 74 rearwardly past the point to which the stud 73 on the slide bar 72 has moved. When the handle 27 returns to the initial position, the spring 76^b and the stud 25^a cause the bar 74 to push against the stud 73 and thus restore the slide 47 and the bracket 62 to initial position. As the bar 74 approaches the forward limit of its movement, it is dis-

engaged from the stud 73 by means such as that fully disclosed in the Sundstrand patent.

The means for driving the type-carrying plungers 9 into contact with the inking ribbon may be similar to that embodied in the well-known Sundstrand adding machine, and hence its construction and operation need not be here disclosed in detail. When the operator pulls the handle 27 forward to print an item, all of the hammers 100 are drawn forward or cocked. Those hammers which will be needed in printing the item are released from the control of their latches 100' by the rising of the farthest leftward of the type bars which are to print, but remain under the control of a rod 113 similar to the rod 113 described in application Ser. No. 110,823 filed July 24, 1916, by Gustaf David Sundstrand (Patent No. 1,455,555; granted May 15, 1923). At the beginning of the return stroke of the handle 27, the rod 113 is disengaged from the hammers by means which may be similar to that disclosed in said application, whereupon those hammers which are not restrained by the latches 100' are driven rearwardly by springs 109 against the type presented to said hammers by the type bars 3.

The adding mechanism comprises a series of adding pinions 125 rotatably mounted upon a shaft 126 which is carried by a frame 127 pivoted at 128. The pinions 125 (of which there is one for each number-printing bar 3) are adapted to mesh with rack teeth 129 formed in the bars 3. When an item is to be added the frame 127 is thrown forward to disengage the pinions 125 from the racks 129 before the bars 3 are raised, and said frame is swung rearwardly just before the bars 3 are moved downwardly. Addition therefore occurs in the downward stroke of the bars 3, the extent of the rotation of the pinions depending, of course, upon the extent of movement of said bars.

The frame 127 is swung to carry the pinions into and out of mesh with the racks 129 by any suitable means, as for example, that fully disclosed in the before-mentioned Sundstrand patent.

The means for carrying from one numerical order to the next higher order may be of any suitable character such as that fully disclosed in the Sundstrand patent and partly illustrated herein. After each carrying operation the slide 159 is restored to its normal (forward) position by a universal rod 165 which is supported by two arms 166 that are pivotally mounted on the shaft 12. Connected to the rod 165 are two links 167 the upper ends of which engage a rod 168 carried by the side members 16.

In the downward movement of the side members 16 (and therefore in the upward movement of the bars 3) the universal rod

165 is moved against the slides 159, thereby restoring any slides that may have been concerned in a previous carrying operation.

When a subtotal or a final total is to be printed the pinions are retained in mesh with the racks during the upward movement of the bars 3. To retain the pinions in mesh with the racks when the handle 27 is pulled forward any suitable means may be provided as, for example, that fully described in said Sundstrand patent.

It may be here stated that when any pinion stands at zero one of the lugs 164 on said pinion lies directly beneath one of the dogs 160. Thus, when a total is to be printed those racks which mesh with the pinions standing at zero can not rise, the remaining racks rising until the rotation of their pinions brings the lugs 164 thereon into contact with the respective dogs 160. The bars 3 are then in position to print the total amount accumulated on the pinions.

When it is not desired to clear the machine after printing a total, the pinions are allowed to remain in mesh with the racks during the downward movement thereof and therefore during the downward movement of the racks the several pinions are rotated to the positions they occupied just before the taking of the total. When, however, the operator wishes to clear the machine, the pinions are withdrawn from the racks before the latter descend, thus leaving all of the pinions standing at zero. This may be accomplished in any suitable manner, as, for example, in the way disclosed in the before-mentioned Sundstrand patent.

Prior to the restoration of a dog 160 which has been involved in a carrying operation, its forward end is not in position to serve as a stop for a lug 164 in the taking of a total. It is therefore desirable to prevent the taking of a total while any of the dogs 160 are out of their normal position. This is accomplished in the before-mentioned Sundstrand patent by means comprising cam shoulders 3^a on the bars 3. When any bar 3 descends below its normal position (as it does in the carrying operation) the shoulder 3^a on said bar engages a rod 48' on the swinging frame 48^a and thus moves said frame back far enough to bring the detent plate 48^a in the path of upward movement of the pins 46. An attempt to print a subtotal or a final total by pulling the handle 27 forward will therefore merely bring all of the pins 46 against the plate 48^a without imparting material upward movement to any of the bars 3 except the bar or bars that were below their normal position. A spacing stroke is thus compelled before a subtotal or a final total can be printed, in case the addition of the last item necessitated carrying. By means such, for example, as that disclosed in the said Sundstrand patent,

the pinions are thrown out of mesh with the racks before the abnormally low racks rise. In other words, the pinions are thrown out of mesh and returned into mesh just as though an item were being added.

While the rod 48' and the cam shoulders 3^a are illustrated in the present drawings, they may be omitted, as the mechanism now to be described performs the same ultimate function.

A plate 300 (Fig. 3) is pivoted to the forward side of the frame 43 by any suitable means such as two screws 301 loosely engaging the plate. The plate 300 is arranged to swing toward and away from the reader, as viewed in Fig. 3. At the lower edge of the plate 300 is a lug 302. A lug 303 on the detent plate 48^a is continually held in contact with the lug 302 through the action of the springs 48^d (Fig. 5).

Means is provided whereby whenever a number key is depressed to set up the first digit of an item, the detent plate 48^a is pushed back into position to prevent pins 46 from rising. This means comprises a lever 304 pivoted in the framework at 305, one arm of which lever is arranged to be moved by the universal bar 59, the other arm of said lever being adapted to move the lug 302 and thus move the detent plate 48^a rearwardly into position to prevent the printing of a total. The detent plate is held in this position against the force exerted by the springs 48^d by means of a latch 306 pivoted to the frame 43 and having a V-shape tooth which is held in contact with the plate 300 by a contractile spring 307. When the lever 304 is operated, the plate 300 is forced rearwardly of the point of the tooth and is held there by the pressure of the latch.

In order to remove the detent plate 48^a from its effective position during the spacing stroke, I provide the following described means. The plate 300 carries a lever 310 for a projection 308 adapted to be struck by a projection 309 on the arm 25 for the purpose of forcing the plate 300 forward and away from the detent plate, thus releasing the latter to the action of the springs 48^d. In order that the projection 309 shall not release the detent plate to the action of the springs 48^d during the printing of an item, but on the contrary, shall release the detent plate only during the taking of a spacing stroke, the projection 308 is made movable into and out of the path of movement of the projection 309. The projection 308 is part of a lever 310 which is pivoted to the plate 300 at 311. The arm 312 of the lever 310 is arranged to abut the lug 67 of the slide 47. A contractile spring 313 tends to move the lever 310 in the direction to lower the projection 308 out of the path of movement of the projection 309. When the slide 47 is in its initial or home position, the

projection 308 is held up in the path of movement of the projection 309. When a digit is set up by the depression of a number key, the resulting movement of the slide 47 causes the projection 308 to be lowered out of the path of movement of the projection 309. When the slide 47 is returned to its home position (as it is before a total or subtotal is to be printed), the projection 308 is raised into the path of the projection 309.

The operation will now be described in connection with Fig. 1^a. When the machine is clear, the parts are in the positions shown in the drawings; the slide 47 is in its extreme leftward position, the plate 300 and the detent plate 48^a are in their forward positions, said detent plate being consequently out of the vertical plane of the pins 46 (see Fig. 4); and the projection 308 is in a prolongation of the path of movement of the projection 309. When the operator sets up the digit "1" by depressing and releasing the appropriate number key, the lever 304 pushes the plates 300 and 48^a rearwardly, thus placing the rear edge of the plate 48^a in the vertical plane of the pins 46. The slide 47 moves one step to the right, thus permitting projection 308 to swing down out of the path of the projection 309. The setting up of the digit "2" does not affect the parts 48^a, 300 and 308. The operator then pulls and releases the handle 27, causing the item "12" to be printed, and the slide 47 to be returned to its extreme leftward position. In such return of the slide 47 the lug 67 strikes the lever 312, thus raising the projection 308 into the path of the projection 309. The setting up of the digit "3", however, permits the projection 308 to descend again. The digit "4" having been set up, the operator pulls and releases the handle 27, the item "34" being thereby printed and the projection 308 again raised. Desiring to print the total of the two items, the operator pulls the handle 27, but since the detent plate 48^a overlies all the pins 46, none of the type bars 3 rises and none of the hammers is released from the latches 100'. However, the forward swing of the projection 309 produced by pulling the handle 27 causes said projection to strike the projection 308, moving said projecting 308 and the plate 300 forward; but the pressure of the pins 46 against the lower side of the detent plate 48^a causes said plate to remain in the plane of said pins until near the end of the return stroke of the handle 27, when the relieving of the pressure of the pins 46 against the detent plate 48^a enables the springs 48^a to move the detent plate out of the vertical plane of the pins 46. Another actuation of the handle 27 effects the printing of the subtotal "46". It will

be noted that a blank or spacing stroke of the handle 27 was compelled, even though the addition of the items did not necessitate carrying.

The setting up of the first digit of the item "56" places the plate 48^a in pin-obstructing position, and lowers the projection 308 out of the path of the projection 309. The printing of the item "56" leaves the detent plate in pin-obstructing position, but raises the projection 308 into the path of the projection 309. The accumulation of the item "56" on the adding wheels 125 necessitated the descent of the tens and hundreds bars 3 below the normal position and left the corresponding dogs 160 out of position to serve in the printing of a subtotal or a final total. An actuation of the handle 27 restores the tens and hundreds bars 3 and the dogs 160 to normal position, and causes the detent plate 48^a to move out of pin-obstructing position. Another actuation of the handle 27 effects the printing of the subtotal "102".

Whether the total shall be a subtotal or a final total depends on whether the pinions 125 are retained in mesh with the racks after the total has been printed and during the return of the racks to their normal down position. The retention of the pinions in mesh with the racks or their withdrawal from the racks is accomplished by suitable mechanism such as that disclosed in the Sundstrand patent, and is not affected by the provisions for compelling a spacing stroke. Consequently the means herein shown for compelling a spacing stroke is effective whether the total to be printed is a subtotal or a final total.

The foregoing detailed description has been given in order to impart an understanding of one embodiment of my invention, without intending to imply that the invention is limited to the constructions and relative arrangement herein disclosed, for it will be obvious that the present invention may be embodied in various forms within the scope of the appended claims.

I claim as my invention:

1. A ten-key adding machine having, in combination, a series of printing elements, a member to obstruct movement of said elements, a slide for freeing said elements successively from the control of said member, a spring tending to move said member out of obstructing position, a pivoted device adapted to move said member into obstructing position, yielding means for holding said device against the pressure of the spring, a lever mounted on said device and movable by said slide, number keys to cause movement of said device and said slide, a main rock shaft, and an arm on said rock shaft adapted to engage said lever and thus move

said device to release said member to the action of said spring.

2. A ten-key adding machine having, in combination, a series of printing elements, a member to obstruct movement of said elements, a slide for freeing said elements successively from the control of said member, a spring tending to move said member out of obstructing position, a pivoted device adapted to move said member into obstructing position, yielding means for holding said device against the pressure of the spring, a lever mounted on said device and movable by said slide, number keys to cause movement of said device and said slide, and means to engage said lever and thus move said device to release said member to the action of said spring.

3. A ten-key adding machine having, in combination, a series of printing elements, adding wheels and carrying mechanism cooperating therewith, a series of stops to limit the movement of the printing elements, ten number keys, stop-setting devices associated with said keys and printing elements, means to cause relative movement between said devices and the series of stops from one order to another in the operation of said keys, means including a rock shaft to operate the printing elements to print a total, and number-key-operated means to render the printing elements inoperative during a reciprocation of the rock shaft.

4. An adding machine having, in combination, a series of printing elements, a member to obstruct movement of said elements, a spring tending to move said member out of obstructing position, a device arranged to engage and move said member, yielding means to hold said device against the pressure exerted by the spring, number keys arranged to move said device, a projection movably supported on said device, a slide movable in the operation of the number keys, said slide controlling the position of said projection, a main rock shaft, and a part movable by said rock shaft to engage and move said projection when the latter is in a single one of its positions.

5. An adding machine having, in combination, a series of printing elements, a member to obstruct movement of said elements, a device arranged to engage and move said member, number keys arranged to move said device, a projection movably supported on said device, a slide movable in the operation of the number keys, said slide controlling the position of said projection, a main rock shaft, and a part movable by said rock shaft to engage and move said projection only when the latter is in a certain position.

6. An adding machine having, in combination, a series of printing elements, setting-up means including number keys and a slide movable in the operation of said keys, said

slide being operatively related to said printing elements, means actuated by said keys for preventing movement of the printing elements, a main rock shaft, and means actuated in the movement of said shaft for releasing the printing elements to movement, said releasing means being controlled by said slide.

7. An adding machine having, in combination, a series of printing elements, setting-up means including number keys and a slide movable in the operation of said keys, said slide being operatively related to said printing elements, means actuated by said keys for preventing movement of the printing elements, a main rock shaft, and a means actuated in the movement of said shaft for releasing the printing elements to movement, said releasing means being rendered inoperative by said slide as said slide is moved in the operation of the keys.

8. A ten-key adding machine having, in combination, a series of printing elements, a device to obstruct movement of said elements, number keys, a part movable in the operation of the number keys to free the printing elements successively from the control of said obstructing device, a main rock shaft, and means operable in the movement of said shaft for freeing all of said elements from the control of said device, said means being effective only when the before-mentioned part is in initial position.

9. A ten-key adding machine having, in combination, a series of printing elements, a device to obstruct movement of said elements, a slide movable to free the printing elements successively from the control of said obstructing device, a main rock shaft, and means operable in the movement of said shaft for freeing all of said elements from the control of said device, said means being effective only when the slide is in initial position.

10. An adding machine having, in combination, a series of printing elements, a member to obstruct movement of said elements, a device arranged to engage and move said member, number keys arranged to move said device, a projection movably supported on said device, a part movable step by step in the operation of the number keys, said part controlling the position of said projection, and means to engage and move said projection when the latter is in a single one of its positions.

11. An adding machine having, in combination, a series of printing elements, a member to render said elements inoperative, a device arranged to engage and move said member, number keys arranged to move said device, a projection movably supported on said device, a part movable step by step in the operation of the number keys, said part controlling the position of said projection,

and means to engage and move said projection when the latter is in a single one of its positions.

12. An adding machine having, in combination, a series of printing elements, a member to obstruct movement of said elements, a device arranged to engage and move said member, number keys arranged to move said device, a projection movably supported on said device, a slide movable in the operation of the number keys, said slide controlling the position of said projection, and means to engage and move said projection —when the latter is in a single one of its positions.

13. An adding machine having, in combination, a series of printing elements, a member to render said elements inoperative, a device arranged to engage and move said member, number keys arranged to move said device, a projection movably supported on said device, a slide movable in the operation of the number keys, said slide controlling the position of said projection, and means to engage and move said projection when the latter is in a single one of its positions.

14. An adding machine having, in combination, a series of printing elements, a member to render said elements inoperative, a device arranged to engage and move said member into effective position, a projection movably supported on said device, setting-up mechanism which when in initial position holds said projection in a certain position, a main rock shaft, and a part movable by said rock shaft to engage and move said projection when the latter is in said position.

15. An adding machine having, in combination, a series of printing elements, a member to render said elements inoperative, a device arranged to engage and move said member into effective position, a projection movably supported on said device, setting-up mechanism which when in initial position holds said projection in a certain position, a main rock shaft, and an arm on said rock shaft to engage and move said projection when the latter is in said position.

16. An adding machine having, in combination, a series of printing elements, a member to render said elements inoperative, a device arranged to engage and move said member into effective position, a projection movably supported on said device, setting-up mechanism which when in initial position holds said projection in a certain position, and means to engage and move said projection when the latter is in said position.

17. An adding machine having, in combination, a series of printing elements, a member to render said elements inoperative, means to move said member into effective position, a movable part associated with said means, setting-up mechanism which when in initial position holds said part in a cer-

tain position, a main rock shaft, and a part movable by said rock shaft to engage and move the first-mentioned part when the latter is in said position.

18. An adding machine having, in combination, a series of printing elements, setting-up mechanism, means operable by the setting-up mechanism to prevent movement of the printing elements, a main rock shaft, and means operable in the movement of said shaft for releasing the printing elements to movement, said releasing means being controlled by the setting-up mechanism.

19. An adding machine having, in combination, a series of printing elements, setting-up mechanism, means operable by the setting-up mechanism to prevent movement of the printing elements, a main rock shaft, and means operable in the movement of said shaft for releasing the printing elements to movement, said releasing means being arranged to be rendered inoperative by the setting-up mechanism.

20. An adding machine having, in combination, a series of printing elements, adding wheels and carrying mechanism operatively related to said printing elements, a device to obstruct movement of said elements, a main rock shaft, and means independent of the carrying mechanism and operable in the movement of said shaft to move said device out of obstructing position.

21. An adding machine having, in combination, a series of type bars, a device to obstruct movement of said bars, a main rock shaft, an arm on said shaft to move said device out of obstructing position, and means to render said arm ineffective to move said device.

22. An adding and listing machine having, in combination, setting-up mechanism, printing mechanism, means to prevent operation of the printing mechanism, and means to render said preventing means ineffective including a part which is movable out of operative position in the operation of the setting-up mechanism to set up a digit.

23. An adding and listing machine having, in combination, setting-up mechanism, printing mechanism, means to prevent operation of the printing mechanism, and means to render said preventing means ineffective including a part which is movable into operative position in the restoration of the setting-up mechanism to initial position.

24. A ten-key adding and listing machine having, in combination, setting-up mechanism including a slide movable step-by-step when setting up digits, printing mechanism, means to prevent operation of the printing mechanism, and means to render said preventing means ineffective including a spring-pressed part engaging said slide.

25. A ten-key adding and listing machine having, in combination, setting-up

mechanism including a part movable step-by-step transversely of the machine when setting up digits, printing mechanism, means to prevent operation of the printing mechanism, and means to render said preventing means ineffective including a spring-pressed part engaging said transversely-movable part.

26. A ten-key adding and listing machine having, in combination, setting-up mechanism including a part movable step-by-step transversely of the machine when setting up digits, printing mechanism, means to prevent operation of the printing mechanism, and means to render said preventing means ineffective including a part which is held in operative position by said transversely-movable part when the latter is in initial position.

27. In an adding machine, a member pivoted upon a vertical axis, a spring-pressed latch, for holding said member in either of two positions, a part pivoted on said member for vertical movement, setting-up mechanism arranged to move said part out of operative position, a main operating handle, and means actuated in the forward swing of said handle to engage said part (when in operative position) to swing said member.

28. In an adding machine, a member pivoted upon a vertical axis, a spring-pressed latch for holding said member in either of two positions, a part pivoted on said member for vertical movement, setting-up mechanism arranged to move said part out of operative position, and means to engage said part (when in operative position) to swing said member.

29. In an invariable spacing-stroke mechanism for an adding machine, a member pivoted upon a vertical axis, a spring-pressed latch for holding said member in either of two positions, a part pivoted on said member for vertical movement, manually-controlled means for moving said part out of operative position, and means to engage said part (when in operative position) to swing said member.

30. In an adding machine, a detent plate 48^a tending to move out of detaining position, setting-up mechanism, a universal member 59 movable by the setting-up mechanism, and a lever 304 movable by said universal member for moving said detent plate into detaining position, means including a

spring-pressed latch for holding the detent plate in such position, and means for withdrawing the holding means.

31. In an adding machine, a plurality of reciprocal members, one for each numerical order, a detent plate for said members, setting-up mechanism arranged to move said detent plate into detaining position, and yielding means to hold said detent plate in such position.

32. In an adding machine, a plurality of reciprocal members, one for each numerical order, a detent plate for said members, setting-up mechanism, a universal member movable by the setting-up mechanism, and a lever movable by said universal member for moving said detent plate.

33. In an adding machine, a plurality of reciprocal members, one for each numerical order, a detent plate for said members, setting-up mechanism, a universal member movable by the setting-up mechanism, and a lever movable by said universal member for moving said detent plate into retaining position, means to hold the plate in such position, a main rock shaft, and a crank arm on said shaft arranged to withdraw said holding means.

34. In an adding machine, a plurality of reciprocal members, one for each numerical order, a detent plate for said members tending to move out of detaining position, setting-up mechanism arranged to move said detent plate into detaining position, yielding means to hold the detent plate in such position, and a main operating handle arranged to withdraw said holding means in the forward swing of the handle.

35. In an adding machine, a detent member to prevent printing, setting-up mechanism arranged to place said member in effective position, means to hold said member in such position, a main rock shaft, and a crank arm on said shaft arranged to withdraw said holding means.

36. An adding and listing machine having, in combination, setting-up mechanism, printing mechanism, means to prevent operation of the printing mechanism, and controlled by the setting-up mechanism for means rendering said preventing means ineffective.

In testimony whereof, I have hereunto set my hand.

OSCAR J. SUNDSTRAND.

Certificate of Correction.

It is hereby certified that in Letters Patent No. 1,583,102, granted May 4, 1926, upon the application of Oscar J. Sundstrand, of Rockford, Illinois, for an improvement in "Adding and Listing Machines," errors appear in the printed specification requiring correction as follows: Page 3, line 85, for the name "Sunstrand" read *Sundstrand*; page 8, line 80, claim 33, for the word "retaining" read *detaining*; same page, line 105, claim 36, after the word "and" insert the word *means*, and line 107, strike out the word "means," first occurrence; and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 8th day of June, A. D. 1926.

[SEAL.]

M. J. MOORE,
Acting Commissioner of Patents.