

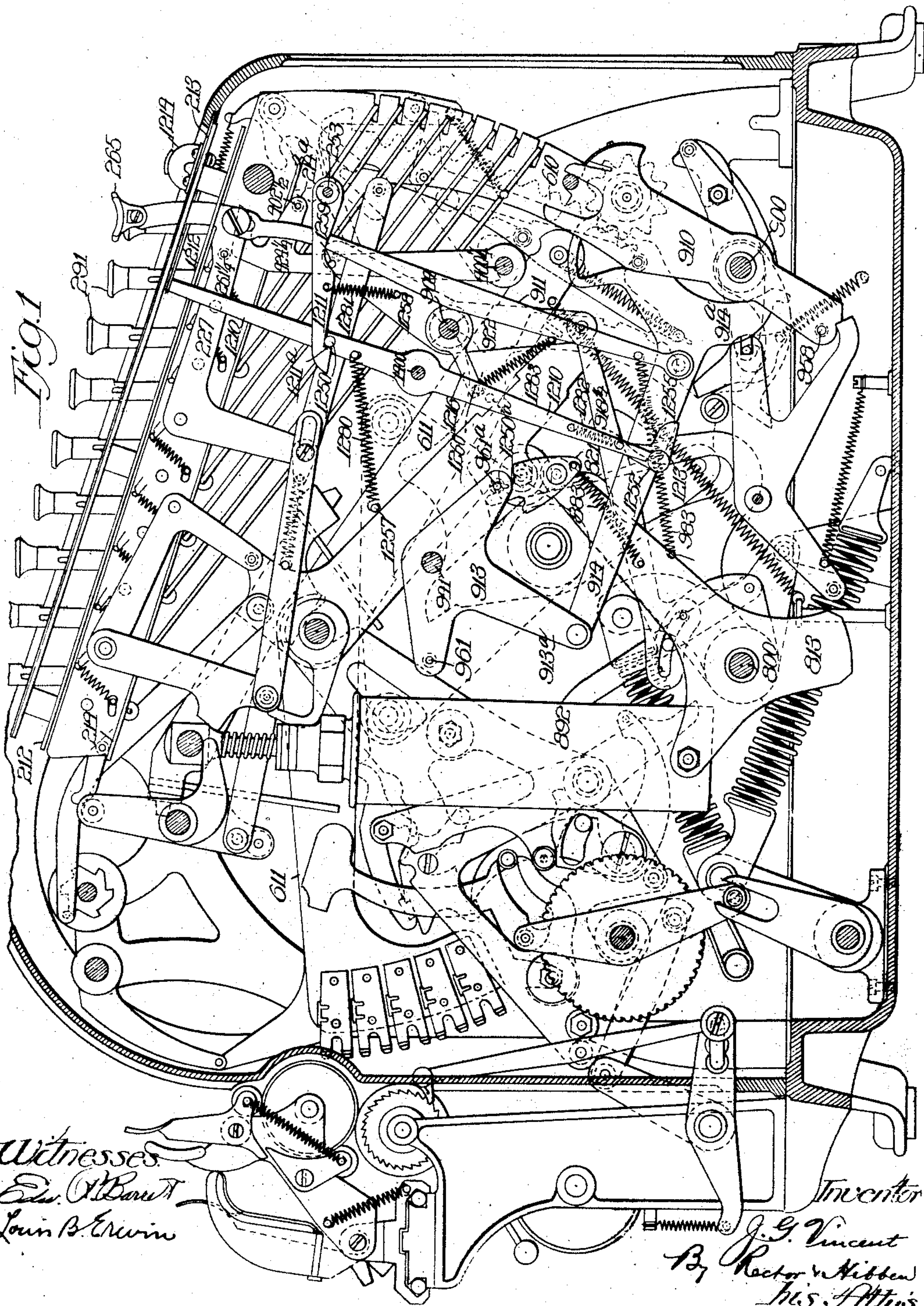
J. G. VINCENT.
ADDING MACHINE.

APPLICATION FILED MAR. 18, 1905.

Patented Jan. 31, 1911.

4 SHEETS-SHEET 1.

983,009.

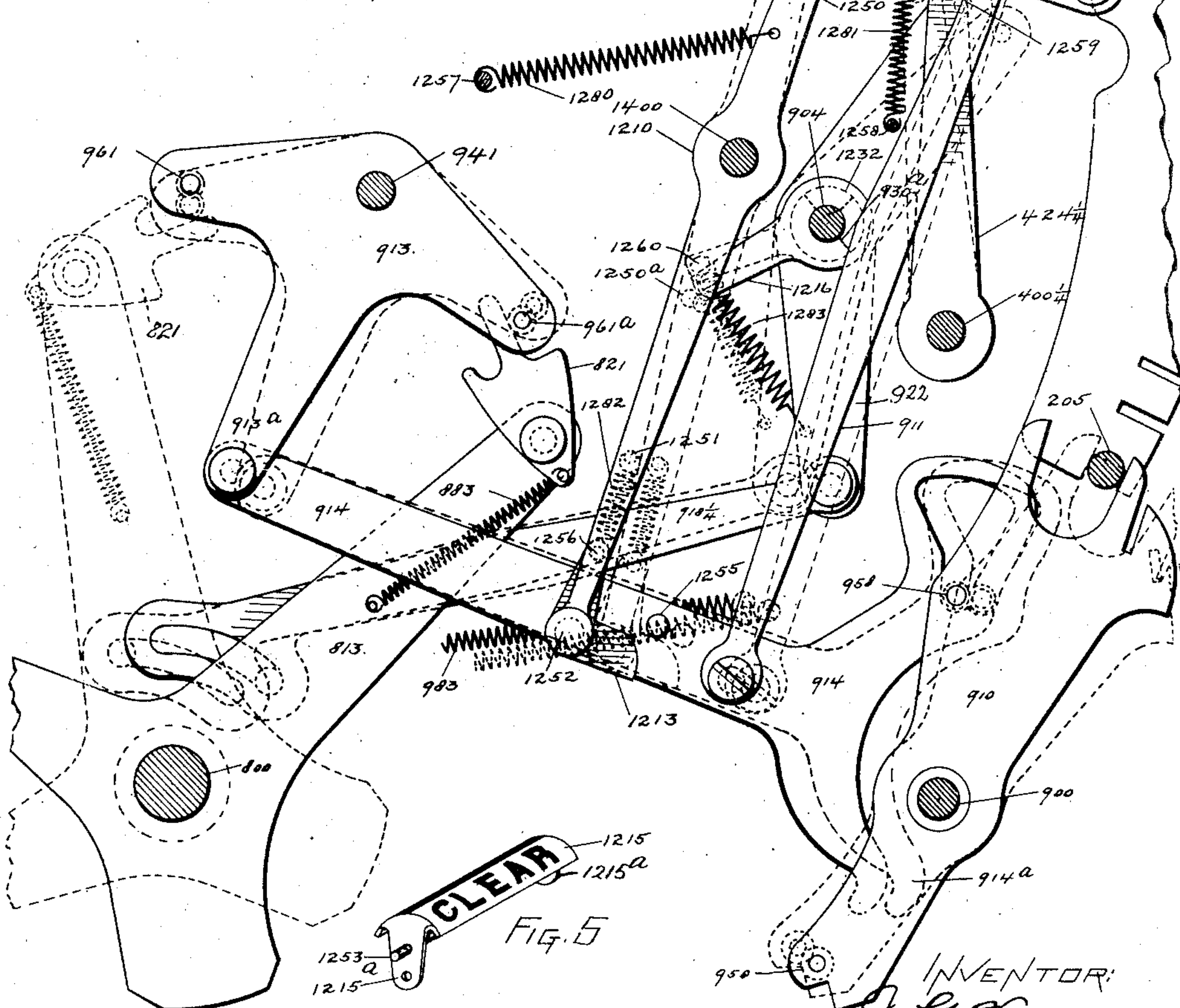
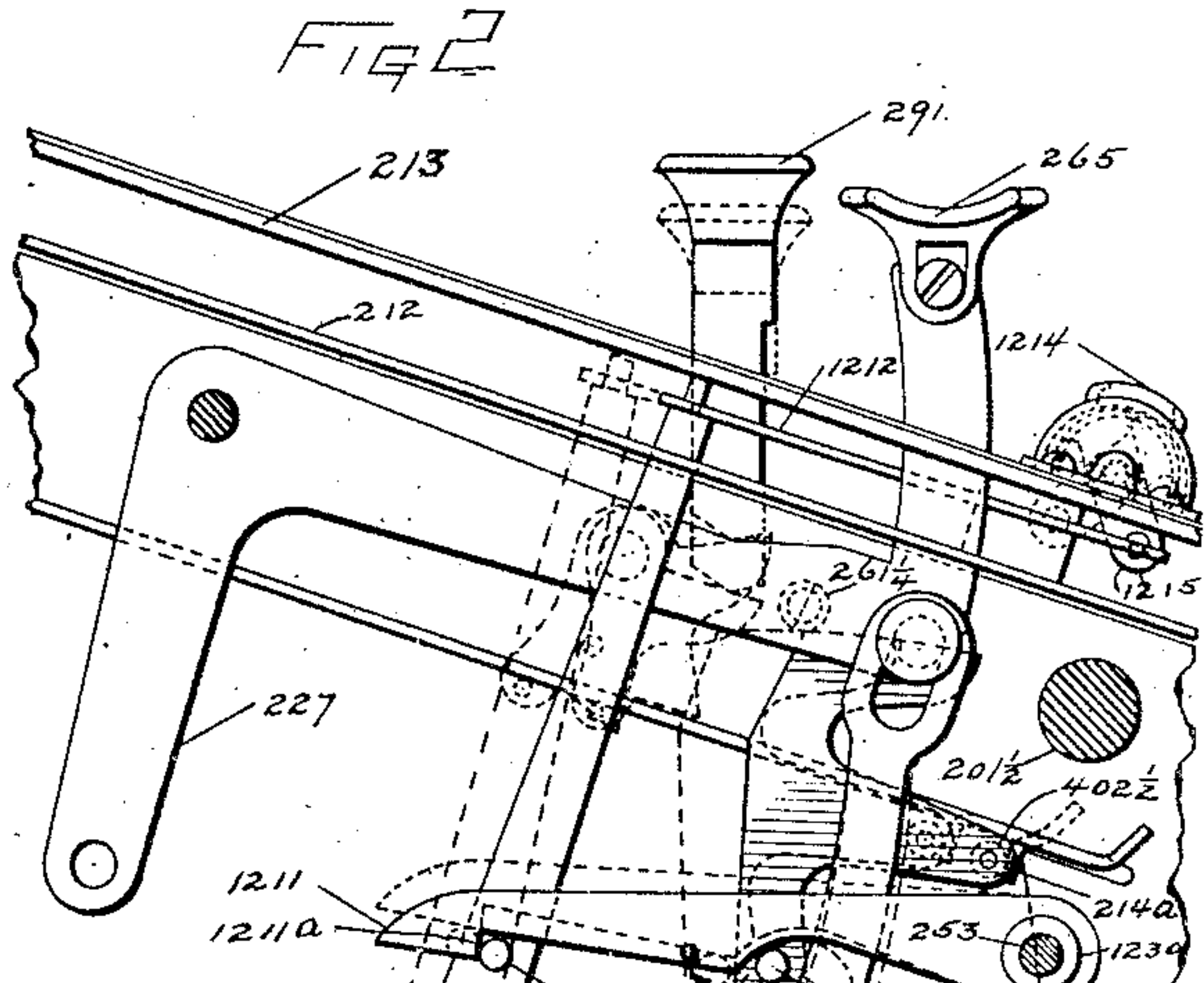
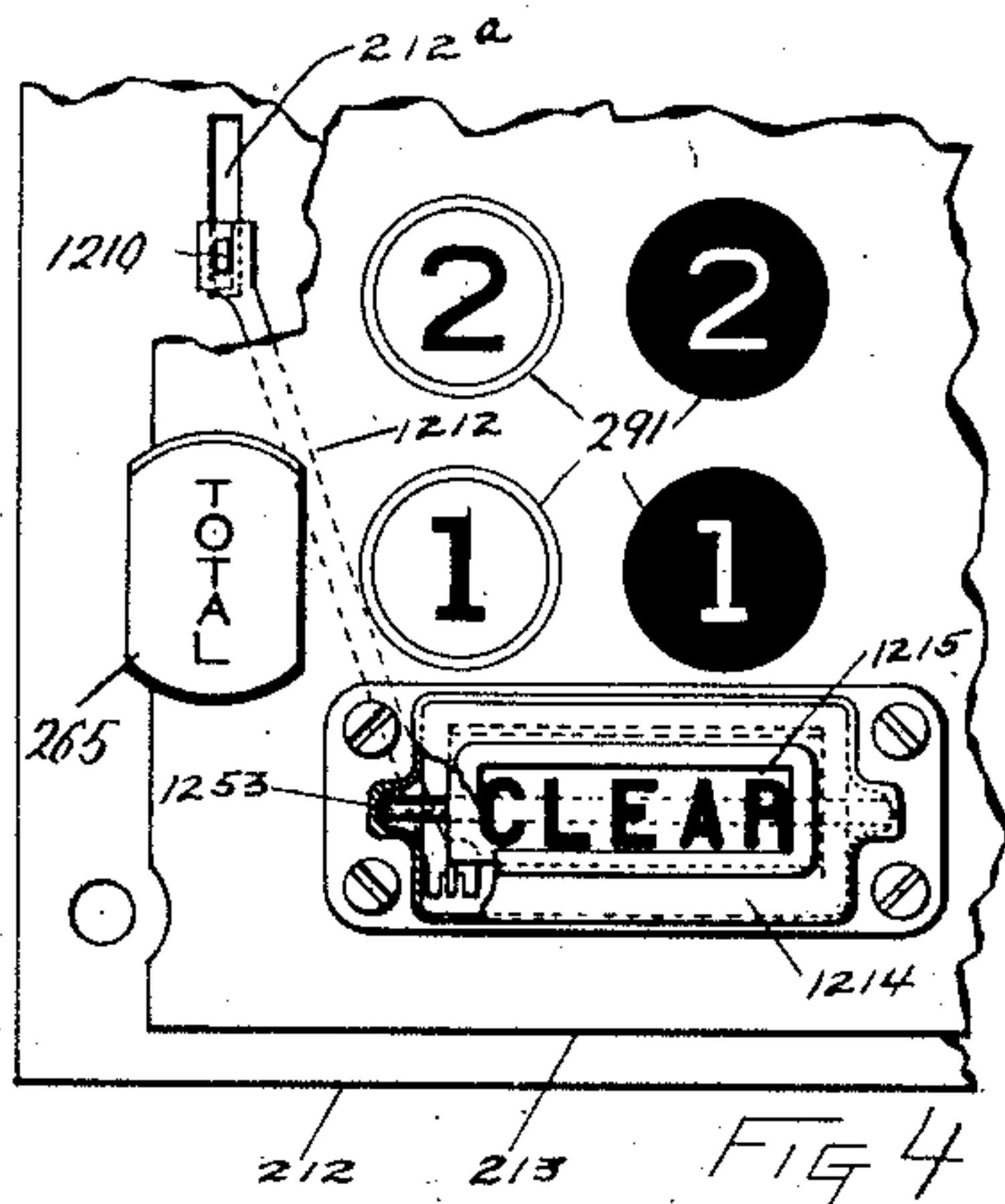


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4 SHEETS-SHEET 2.



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ADDING MACHINE.

Patented Jan. 31, 1911.

4 SHEETS—SHEET 3.

983,009.

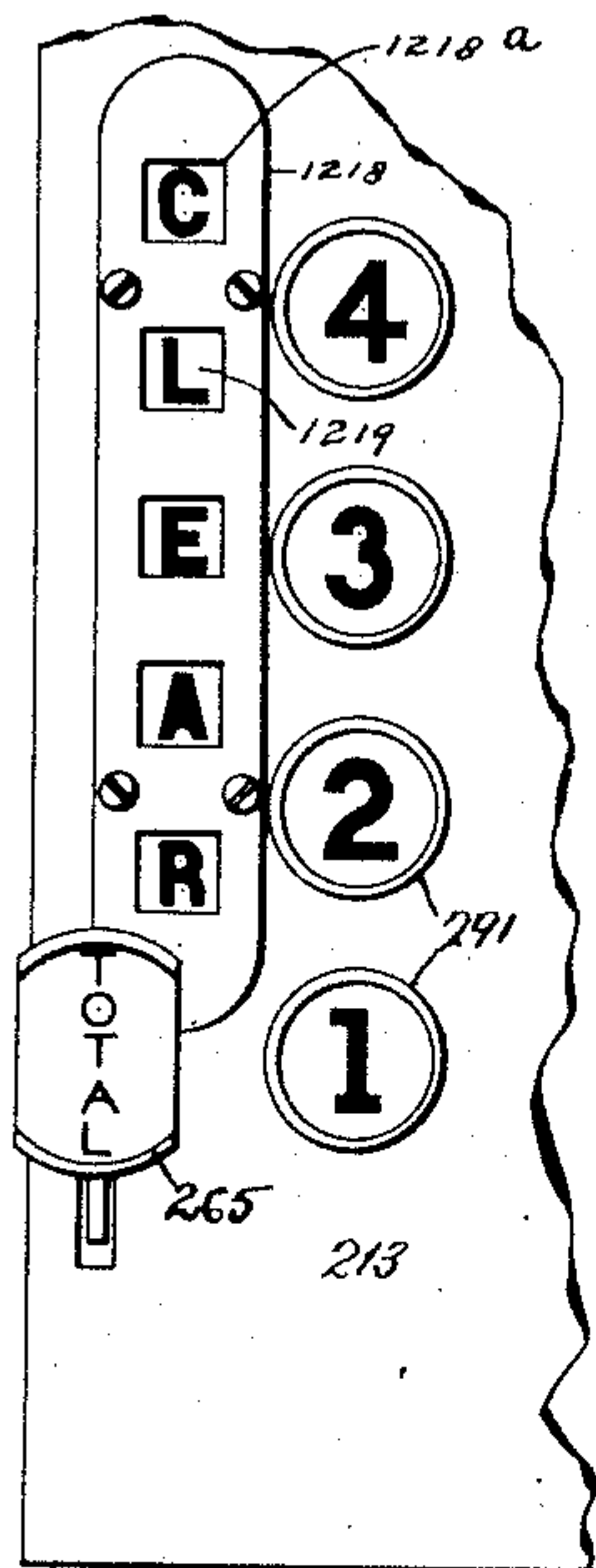


FIG. B

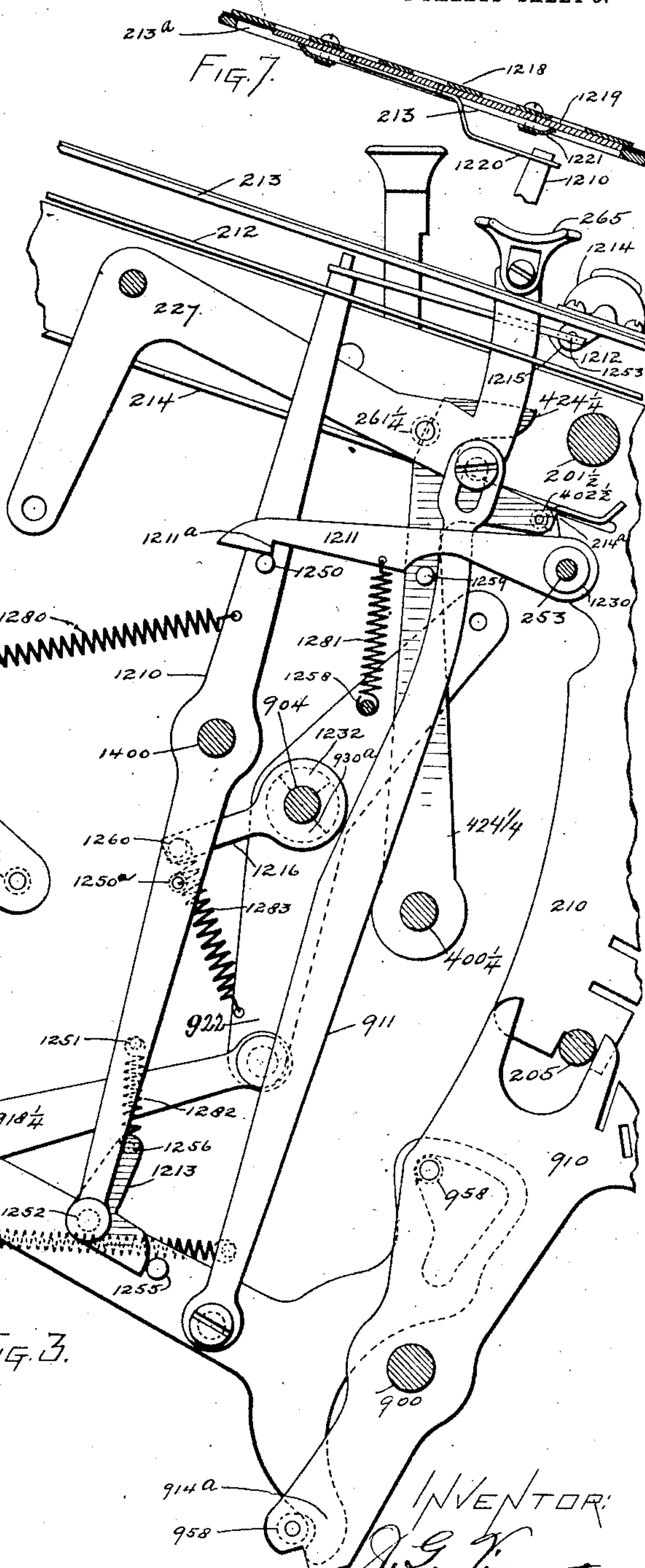


FIG. 3.

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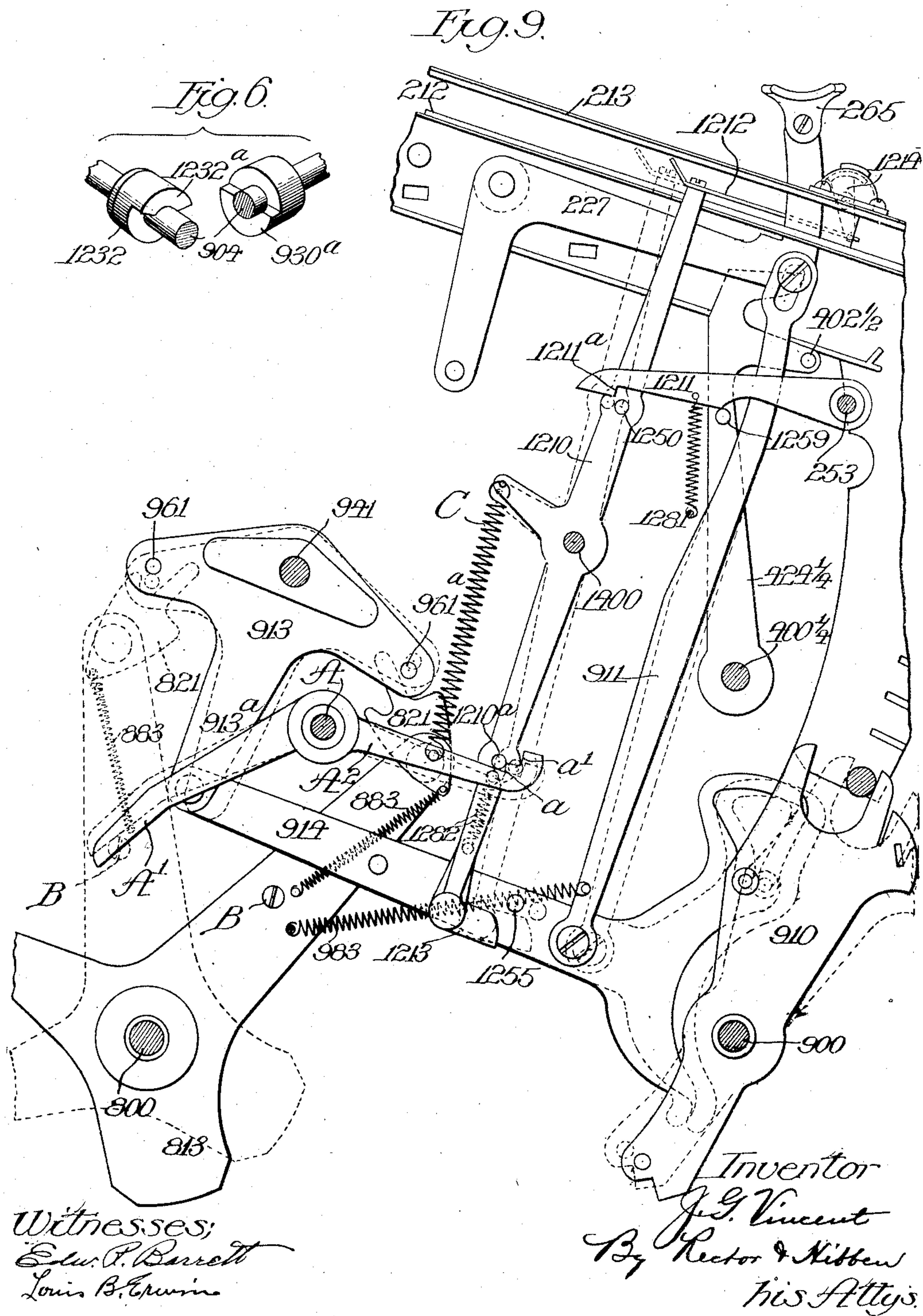
ADDING MACHINE.

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4 SHEETS-SHEET 4.

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UNITED STATES PATENT OFFICE.

JESSE G. VINCENT, OF DETROIT, MICHIGAN, ASSIGNOR TO BURROUGHS ADDING MACHINE COMPANY, OF DETROIT, MICHIGAN, A CORPORATION OF MICHIGAN.

ADDING-MACHINE.

983,009.

Specification of Letters Patent. Patented Jan. 31, 1911.

Application filed March 18, 1905. Serial No. 250,842.

To all whom it may concern:

Be it known that I, JESSE G. VINCENT, a citizen of the United States, residing at Detroit, Wayne county, Michigan, have invented certain new and useful Improvements in Adding-Machines, of which the following is a specification.

My invention relates to what are commonly designated as adding or calculating machines of the type adapted to print, list and add or accumulate individual items and also to print a total or footing of such items at the will of the operator; which type of machine is exemplified by the well known Burroughs adding machine as substantially illustrated and described in United States Letters Patent Nos. 504,963 and 505,078, issued on September 12, 1893, for the inventions of William S. Burroughs.

The object of my invention is to provide novel, simple and efficient mechanism for indicating to the operator by a visual indicator or signal or otherwise the fact whether the machine is "clear", that is, set at zero position, or whether an item or amount remains in the machine, (thereby rendering the machine in "non-clear" condition) with the result that the operator, when about to begin a new list of items, may tell at a glance whether the machine is in condition to receive such new list. To this end, and as hereinafter more specifically described, I provide *e. g.* a visual signal upon the keyboard and put the same under the control of the "clearing" mechanism of the machine by means of such connections that whenever the "clearing" mechanism is operated the signal which has theretofore been moved or shifted from "clear" to "non-clear" condition or indication shall thereby be restored to "clear" position, it being understood that the signal is changed to "non-clear" position upon the operation of the machine for the first item and remains in such "non-clear" position for all subsequent items and in fact so long as any item or amount remains in the machine and until the machine is cleared.

For the sake of affording a clear understanding of my invention, I have chosen to describe and illustrate it in connection with the well known Burroughs adding machine, in which my invention may be incorporated as an improvement or attachment without

alteration of the old parts thereof. However, it will be understood that my invention is not to be limited, in its application, to this particular type of machine, but that it may be applied and used in connection with other machines of the same general type and used for the same general purposes.

In the drawings, Figure 1 is a sectional elevation of a Burroughs adding machine, the section being taken just inside of one of the side frames and illustrating the left-hand side of such machine with my invention embodied therein; Figs. 2 and 3 full sized views of certain of the parts of the Burroughs machine together with the parts of my improvements and illustrating different relative positions thereof; Fig. 4 a plan view of the signal proper and a part of the keyboard; Fig. 5 a perspective of the signal proper; Fig. 6 detail views of the means for operating the arm 1216; Fig. 7 a section of a part of the keyboard illustrating a modified form of signal; Fig. 8 a plan view of such modified signal; and Fig. 9 an elevation of modified construction of the signal controlling mechanism.

Inasmuch as the Burroughs machine is well known as to its general construction and mode of operation, only those parts thereof which are more or less directly concerned with the operation of my signal and its connections need be described.

As is well known, the keyboard of the Burroughs adding machine is provided with a series of keys 291 arranged in rows of different denominations, increasing from right to left, and each row having keys representing the digits 1 to 9, in addition to which such keyboard is provided as shown, with a total key or button 265 which, whenever depressed, controls the action of the "clearing" and totaling mechanism. When the total key or button is depressed and kept depressed throughout the full stroke of the operating handle—that is, during one complete operation of the machine, a grand total is taken, but in case such total key or button is kept depressed only during the forward movement of the operating handle, only a sub-total is taken or imprinted upon the paper on the platen. Consequently, when a grand total is taken the machine is cleared, but when only a sub-total is taken the machine is not cleared, but the amount of the

sub-total remains in the machine as an amount to which the subsequent items are still to be added. As is well known, whenever the operating handle is pulled forward (the total key not being operated) the pinion frames 910 which carry the adding wheels are at once thrown out of engagement with the racks 610, with which they normally engage or mesh, such action being brought about by the rocking of the arm 813, which is mounted upon the shaft 800 and is operatively connected with a bifurcated pitman 914 whose bifurcations are adapted to be operatively connected with the left-hand side of the pinion frame 910 which is mounted on the shaft 900, as illustrated in Fig. 1. The rocking arm 813 which in the forward movement of the operating handle moves in an anti-clockwise position (Figs. 1, 2 and 3) is provided at its upper end with a wipe plate or block 821, which is spring pressed by means of the spring 883. This wipe plate is arranged to actuate a three-arm plate 913 which is mounted upon the shaft 941 and provided upon two of its arms with studs or pins marked 961 and 961^a. The other arm 913^a is pivotally connected to the rearward end of the pitman 914. Upon the first or rearward movement of the rocking arm 813, the wipe plate 821, by its engagement with the pin or stud 961^a, moves or swings the rocking plate 913 and consequently its arm 913^a in an anti-clockwise direction, with the result that the pinion frame 910 and adding wheels mounted therein are rocked forwardly to the right in Figs. 1, 2 and 3, by reason of its connection with the rocking plate 913, through the medium of the pitman 914. The sector bar 611 (Fig. 1) as well as the sector 610 corresponding to the row of any operated or set key or keys will descend a distance corresponding to the value of the particular key or keys so operated but without affecting the adding wheels which have been rocked out of engagement with the sectors, as just described. Upon the return movement of the rocking arm 813, its wipe plate 821 will engage the stud 961 and restore the rocking plate 913 as well as the pinion frame 910 and the adding wheels and pinions carried thereby to the normal position illustrated in Fig. 1, so that such adding wheel pinions will be brought into mesh or engagement with the sectors 610 so that after the item has been printed and as the operating handle is on its return stroke, the amount or value of any depressed key is transferred from its sector bar to its corresponding pinion and adding wheel in the upward and restoring movement of such sector bar or bars. When, however, a grand total is to be taken the operator depresses the total key or button which by reason of its connection with the pitman 914 through the medium of the long vertical link 911 (spring

pressed by a spring 983) and the arm 227 operatively connected with the upper end of such link, the bifurcated end of the pitman 914 is depressed to the position indicated in Fig. 3, with the result that when the arm 813 is rocked to the left and the pitman 914 thereby shifted to the right, Fig. 1, the pinion frame 910 is not moved by reason of the change in position of the pitman 914, and consequently the adding wheels remain in operative relation with their sectors 610. Upon further operation of the machine, the amounts on the adding wheels will be transferred to the sectors 610 which will be allowed to descend a distance corresponding in value to its corresponding adding wheel. After the total has been printed in the well known manner, the rocking arm 813 by engagement with the stud 961 moves the pitman 914 rearwardly or to the left in Fig. 1, with the result that the pinion frame 910 is rocked forwardly so as to remove its adding wheel pinions out of engagement with the sectors 610, whereupon said sectors are returned to normal position without disturbing or moving the adding wheel pinions which, in this operation of taking the total, have all been turned to "clear" or zero position. After the sectors 610 are restored to normal position, the pinion frame 910 and its adding wheel pinions are rocked rearwardly to normal position with the adding wheel pinions in engagement with their sectors. The operation just described is that for taking a "grand total" but when it is desired to take simply a "sub-total", the total key is not kept depressed during one entire cycle of operation of the machine or complete stroke of the handle, but is released at the end of the forward movement of the operating handle, with the result that the adding wheel pinions are permitted to remain in mesh with their sectors 610 during the upward or restoring movement of the latter, whereupon the amounts or values which were transferred from the adding wheels to the sectors have now been transferred back to the adding wheels after such amount, which is the sub-total, has been imprinted upon the paper on the platen.

In a Burroughs machine each row of keys is provided with a plate 214 adapted to slide to the left upon the depression of any one of the keys in its row. One result of this sliding movement of the plate is to rock a bail for the purpose of locking the total key in normal position and prevent the depressing of such total key when any one or more of the keys on the keyboard is set. As herein shown, each bar 214 is provided with a depending lug 214^a which, when such bar is slid, as explained, moves a universal bar 402 $\frac{1}{2}$ to the left, this bar forming a part of the bail comprising also two side arms 424 $\frac{1}{2}$ which are mounted to swing upon the

shaft 400 $\frac{1}{2}$. When the bail is thus swung to the left, its upper end is brought into the path of movement of the projection 261 $\frac{1}{2}$ on the arm or key stem 227 so that the total key is locked in upward position.

The parts above described are those which are well known in the Burroughs machine and comprise the parts which are more directly concerned with the construction and operation of my clear signal device, which will now be explained.

Upon the shaft or stud 1400, I swing or pivot a long vertical arm 1210 which will hereinafter be termed the signal arm, the upper end thereof being operatively connected with the signal proper by suitable connections. As herein shown, the signal proper comprises a curved plate or partial drum 1215 having at one portion thereof the word "C-L-E-A-R" and another portion by preference colored red to indicate danger or "non-clear" position Fig. 5. This signal is arranged within a case 1214 having a sight opening so as to expose the indications made by the signal in its different positions. At opposite ends the signal has radial arms 1215^a, and through these arms is passed in a pin 1253 whose ends, projecting beyond said arms form the axis or trunnions for the signal, Figs. 4 and 5. One of these arms 1215^a is extended and is pivotally connected to one end of a link 1212, whose other end is connected with the upper end of the signal arm 1210 with the result that the movements of such signal arm are communicated to the signal and the latter thereby rocked correspondingly from one position to another in the above operations of the machine, as hereinafter explained. It will be understood that the case 1214 is mounted upon and secured to the upper keyboard plate 213 in suitable manner and also that a slot or opening is provided in such upper plate to permit the extended arm 1215^a to pass through. The upper end of the signal arm passes through a slot 212^a (Fig. 4) in the lower keyboard plate 212 and the operating connection or link 1212 therefore operated in the space between the two keyboard plates, Figs. 1, 2 and 3. The signal, which, in the present instance, is placed near the lower left-hand corner of the keyboard adjacent the total key, is thus within the vision of the operator as he stands before the machine ready to operate it.

The signal arm is under the control of three parts which I will term interferences, the first interference being directly under the control of the key mechanism and being operated only when any one of the keys is set. The second interference is under the control of the parts connected with the dash-pot in such manner that it cannot be removed from the path of the signal arm until

the machine has been operated far enough to actually get an amount into the machine. The third interference is directly under the control of the total key and its connections, or in other words, under the direct control of the "clearing" mechanism, and is for the purpose of changing the position of the signal arm from "non-clear" to "clear" position.

As herein shown, the first interference comprises a latch 1211 which is pivoted upon a shaft or stud 253 and projects rearwardly in such manner that its shoulder 1211^a formed on its under edge and near its outer or free end, is adapted to engage a small pin or stud 1250 extending laterally from the signal arm 1210. This latch is normally held downwardly as to its outer or free end with a yielding pressure, as by means of the coiled spring 1281 fastened at one end to the latch and at its other end to a fixed pin 1258. In its normal position the latch engages the stud 1250 and thereby restrains the signal arm from moving to the left as to its upper portion above its pivotal point, such signal arm being under a constant tension to move in said direction, caused by a coiled spring 1280 fastened at one end to the signal arm and at its other end to a fixed pin 1257, as clearly indicated in Figs. 1, 2 and 3. As above stated, this latch is under the direct control of any one of the keys and to this end advantage is taken of movement of the bail which serves to lock the total key. In the present instance, I provide the side arm 424 $\frac{1}{2}$ of this bail with a stud 1259, which is adapted to engage and coöperate with a cam surface on the lower edge of the latch 1211 at a point intermediate its length (Figs. 1, 2 and 3). When this bail is in normal position, that is when none of the keys is depressed or set, the latch is in normal position engaging the signal arm and holding it to normal or "clear" position, as seen in Fig. 1. When, however, an item or amount is set up on the keyboard and one or more keys thereby depressed the bail is rocked to the left with the result that the stud 1259, coöperating with the cam surface on the latch, will raise the latch 1211 against the tension of the spring 1281 and thereby disengage the same from the signal arm. This operation removes the first interference which is the latch 1211, but the signal arm is still restrained by the second interference which will now be described. The second interference comprises, in the present instance, and arm 1216 pivoted upon the shaft 904 and directly under the control thereof, which shaft in turn is under the control of the parts working the dash-pot 892, through the medium of arm 922, link 918 $\frac{1}{2}$ and arm 813, Figs. 1, 2 and 3. The arm 1216 is spring-pressed to its normal position by a coiled spring 1283 secured at its lower end

to the arm 922 and at its upper end to a stud 1260 on the arm 1216. When the machine is in normal position as well as in "clear" condition and the signal arm therefor in "clear" position, the outer end of the arm 1216 is positioned directly in the path of a stud 1250^a projecting inwardly from signal arm 1210. When the first interference 1211 is removed by depressing a key, as has already been described, the upper end of the arm 1216 would move rearwardly were it not for the fact that the outer end of the arm 1216 is positioned directly in the path that the stud 1250^a would have to travel to allow this movement. It will be seen therefore that the signal arm 1210 cannot change position until the second interference 1216 has been removed from the path of 1250^a, which is accomplished in the following manner:

The arm 1216 is provided with a hub 1232, whose inner end has a clutch 1232^a cut thereon, Fig. 6. Shaft 904 is provided with a similar clutch 930^a adapted to engage the clutch 1232^a and move it to the position shown in Fig. 3, when the handle is moved to the extreme forward position. During a full operation of the machine the arm 1216 will move upwardly and from in front of stud 1250^a at the end of the forward stroke of the handle and immediately return to a position in front of stud 1250^a as the handle starts on its rearward stroke, provided no amount or item was placed on the keyboard and latch 1211 was therefore engaging stud 1250, but if on the other hand, an item had been placed on the keyboard and the first interference (latch 1211) was therefore out of engagement with stud 1250, as soon as the arm 1216 moves from in front of stud 1250^a and thereby leaves the signal arm 1210 free to move, this arm would immediately change to the position shown in dotted lines in Fig. 2 or solid lines in Fig. 3, bringing stud 1250^a directly under and in the path of the outer end of arm 1216. When, in the restoring movement of the operating handle, shaft 904 returns to normal position carrying with it arm 922, the spring 1283 is extended, leaving the outer end of arm 1216 above normal position and retained in this upper position by stud 1250^a, Fig. 3. The lost motion provided for in the clutch member 1232^a by making it less than semi-tubular as shown in Fig. 6, permits the necessary independent movement in this operation between the two clutch members.

Assuming that an amount has been set up in the machine, the latch 1211 is disengaged from the signal arm and the latter remains restrained in its "clear" position by reason of the second interference 1216. It is desirable that this second interference (arm 1216) remain in the path of stud 1250 until such time as the amount set up on the key-

board has actually been imprinted upon the paper on the platen, and to accomplish this result I have taken advantage of the movement of the shaft 904, which is a regular part of the Burroughs adding machine, this shaft having a slight clockwise movement at the end of the forward stroke of the operating handle during or just after the hammers have imprinted the amount upon the paper upon the platen. This slight clockwise rotation of shaft 904 is sufficient to raise arm 1216 and performs this function at just the right moment.

As has already been explained, when an amount has been set up on the keyboard and latch 1211 is therefore out of engagement with stud 1250, the handle being drawn forward to the end of this stroke, shaft 904 removes interference 1216 and allows signal arm 1210, or rather the lower end thereof, to move forward or to the right, Figs. 1, 2 and 3. The upper end of the signal arm 1210 will therefore move rearwardly or to the left and through the medium of the link 1212 will oscillate partial drum 1215 to expose the portion colored red to indicate "non-clear" condition. On the return stroke of the handle, arm 1216 is retained in an upper position by stud 1250^a, as has already been explained, but arm 922 will return to normal position, stretching or extending the spring 1283. The arm 1216 will remain in this upper position during subsequent operation of the machine and until such time as the total key is depressed in the manner and with the results hereinbefore described, whereupon the stud 1255 (which I have termed the third interference) projecting from the side of the pitman 914, is brought to a position just in advance of the bell-crank shaped lever or plate 1213, which is normally held with a yielding pressure to the position indicated in Figs. 1 and 2, by means of a spring 1282 fastened at its upper end to a stud 1251 on signal arm 1210 and at its lower end to a stud 1256 on the bell-crank lever 1213. This lever 1213 is pivoted on stud 1252 on the lower end of the signal arm and its lower member or arm is extended forwardly toward the stud 1255. The relative arrangement of this stud and the bell-crank shaped lever 1213 is such that when the total key is first depressed such stud will bear upon the lower end of bell-crank lever and rock it slightly against the tension of its spring, but just as soon as the operating handle is drawn forward so as to cause a forward movement of the pitman 914, the stud will take its position immediately in front of the bell-crank lever 1213, which during the subsequent and rearward movement of the pitman will act as an abutment or interference between such pitman and the lower end of the signal arm, Fig. 3, with the result that such signal arm will

be moved as to its lower end toward the left, Figs. 1, 2 and 3, and its stud 1250^a moved from under the outer end of arm 1216, thus allowing the arm 1216, or second interference, to be drawn through the medium of spring 1283 to a normal position in front of the stud 1250^a. During this rearward movement of the lower end of signal arm 1210 it will be understood that the upper end is moved forwardly or to the right against the tension of its spring 1280, whereby partial drum 1215 is rocked, through the medium of link 1212, to the division marked "clear" to thereby indicate a "clear" condition of the machine, Figs. 1 and 2.

The operation just described is for taking a full or grand total, but when a sub-total is taken, that is, when a total is printed but retained in the machine, to which subsequent items are to be added, the machine remains in a "non-clear" condition and the signal must therefore not be changed from a "non-clear" to a "clear" position. The operation of taking either a total or a sub-total is exactly the same on a Burroughs adding machine during the forward stroke of the handle, during which stroke pitman 914 has been brought to the position illustrated in Fig. 3, but at this moment when taking a sub-total the total button 265 is released and allowed to ascend to normal position, carrying with it through the medium of link 911 the pitman 914, thereby carrying the third interference 1255 above the forward end of bell-crank lever 1213 to the position illustrated in Figs. 1 and 2. This operation also carries the lower hook 914^a on pitman 914 above and out of engagement with stud 958 on side plate 910. As the lever starts on its return stroke, thereby moving pitman 914 rearwardly, as hereinbefore described, the plate 910 will not be oscillated because hook 914^a rides over and misses pin 958. On this rearward movement pitman 914 will carry with it the third interference 1255, as in a full total, but as this pitman 914 is in an upper position, as illustrated in Figs. 1 and 2, it will entirely miss the end of the bell-crank lever 1213 and allow this lever as well as the lower end of 1210 to remain in a forward position, and thereby not disturb the signal which stands in a "non-clear" position.

The different positions of the parts constituting and associated with my clear signal mechanism are clearly indicated in the drawings. For instance, the normal or "clear" position is shown in full or solid lines in Figs. 1 and 2 and the "non-clear" position is shown in Fig. 1 in dotted lines. Fig. 3 shows the relative position of the parts upon the depression of the total key while the signal is in "non-clear" position and just prior to the restoration of the sig-

nal to "clear" position by the third interference.

It will be understood from the foregoing description that the first interference cooperating with the signal arm is disengaged immediately upon the setting of any one of the keys on the keyboard, but such arm remains restrained against the movement by means of the second interference consisting of lever 1216. After a key or keys has been depressed on the keyboard, the first interference (latch 1211) will be in the position shown in dotted lines in Fig. 2, but the signal arm will remain in the position shown in solid lines in said Fig. 2 and the signal will show "clear" through the sight opening of the case. At this time the signal arm is restrained by the second interference, as the stud 1250^a is engaged by the end of the arm 1216 in its position as shown in solid lines in Fig. 2. When, however, the handle is pulled to the end of the forward stroke and arm 813 thereby rocked in an anti-clockwise direction, drawing with it link 918¹, the shaft 904 is rocked in a clockwise direction through the medium of link 922, thereby raising the second interference (arm 1216) to the position shown in dotted lines in Fig. 2. This movement of arm 1216 permits stud 1250^a to be moved in a forward position by the signal arm 1210, thereby allowing such arm to take the position shown in dotted lines in Fig. 2. This movement of the signal arm 1210 slightly oscillates the partial drum 1215 and allows it to exhibit its red portion through the sight opening as hereinbefore described and thereby indicate "non-clear" condition of the machine.

In Fig. 3 I have illustrated the relative positions of the parts after depression of the total key and a half movement of the rocking arm 813, at which time the bell-crank lever 1213 is in its position rearwardly of stud 1255, so as to be actuated by the latter in the restoration of the signal arm to normal position and the consequent restoration of the signal from "non-clear" to "clear" position. This restoration of the signal occurs just after the printing of the total.

The type of signal above described is an oscillating drum or partial drum, but it will be understood that the signal arm may be connected to different forms of signal. For instance, as illustrated in Figs. 7 and 8, such arm may be connected with a sliding plate 1219 by means of a link 1220, such plate being arranged to move back and forth in a slot 213^a in the upper keyboard plate. Extending longitudinally of this plate are the letters "C-L-E-A-R", separated by spaces which are preferably colored red. This signal or signal plate cooperates with a plate 1218, which is secured to the upper keyboard plate 213 over said slot therein and the same

is provided with a series of sight openings 1218^a, which are five in number, with the result that when the signal plate is in normal position the letters of the word "clear" will be exhibited through said openings, whereas, when the sliding plate is in its other position the red spaces are exhibited through such openings to indicate "non-clear" position.

By preference, as herein shown and described, the signal is not moved or shifted from one position to the other until the first item is positively in the machine, or until the machine is positively cleared. As will be understood from the foregoing description, the signal is shifted from "clear" to "non-clear" after the first item has been printed or recorded, and is, in fact, positively in the machine, and such signal is not shifted back to "clear" position until the operation for printing a total is completed or immediately thereafter, at which time the machine is positively cleared.

Referring to the modified form of signal device, which is illustrated in Fig. 9, two interferences are provided of which the first one is the same in construction and mode of operation as the interference comprising essentially the latch 1211 hereinbefore described, which together with all similar parts, are numbered the same as in the preferred form. Such first interference need not, therefore, be further referred to. The second interference comprises a lever pivoted upon a shaft A and having the two arms A¹ A² on opposite sides of its pivotal point. The arm A² which extends as to its outer end adjacent to the lower end or portion of the signal arm is provided on its upper edge with two separate shoulders *a*, *a*¹, which are adapted at different times and under different conditions to engage a stud or pin 1210^a on the signal arm 1210. In the normal condition of the machine and even after a key has been depressed and until the item or amount so set up on the keyboard has been printed, this second interference remains in its normal position illustrated in Fig. 9, with its shoulder *a* in engagement with the stud 1210^a and preventing movement of the signal arm 1210 even though the latter may have been released as to the first interference.

Assuming that an amount has been set up in the machine, the latch 1211 is disengaged from the signal arm but the latter remains restrained by the second interference. Such second interference is, however, actuated and the signal arm thereby disengaged and permitted to move in the further operation of the machine and to this end I provide a projection or stud B upon the rocking arm 813 and locate the same in such a position as to contact and move the rearward end of the arm A¹. When such rocking arm 813 is rocked rearwardly or to the left (Fig. 9)

this stud B will rock the arm A¹ upwardly and the other arm A² downwardly, thereby removing the shoulder *a* from engagement with the stud 1210^a and permitting the signal arm or rather the lower end thereof to move to the right or forwardly of the machine a slight distance until stopped and held by the second shoulder *a*¹. The signal which had heretofore shown or indicated "clear" has now been oscillated by reason of its connections with the upper end of the signal arm, to indicate "non-clear" position, such as the red space formed on the signal. The signal remains in this position for all the subsequent items listed, but when it is desired to take a total, the total key 265 is depressed in the manner and with the result hereinbefore described, with the result that such signal arm will be moved as to its lower end toward the left, Fig. 9, and its stud 1210^a moved from engagement with the shoulder *a*¹ to such position as to be engaged by the shoulder *a*, it being understood that the arm A² is normally upwardly spring pressed to accomplish the result stated. In the present instance, this arm A² is spring pressed by means of the same spring C, which is connected with the signal arm 1210. The means for restoring the signal arm to normal position are thus the same as those heretofore described and corresponding parts are therefore similarly indicated by reference characters.

Fig. 9 illustrates the position of the parts just after any one of the keys on the keyboard has been operated or depressed, with the result that the first interference (latch 1211) has been disengaged from the pin or stud 1250, but at this time, as illustrated in said figure, the second interference, consisting of the lever arm A², is still effective, but adapted to be released in the operation of the machine in the manner hereinbefore explained.

I claim:

1. In an adding machine, the combination with setting up adding and printing mechanism and mechanism for "clearing" the machine, of means affected by the setting up of an item and indicating "clear" and "non-clear" conditions of the adding mechanism, said means being arranged to change the indications from "clear" to "non-clear" upon the printing of the first item set up in the machine.

2. In an adding machine, the combination with setting up adding and printing mechanism and mechanism for "clearing" the machine and printing a total, of means affected by the setting up of an item and indicating "clear" and "non-clear" conditions of the adding mechanism, said means comprising a signal arranged to exhibit said "clear" and "non-clear" indications, and connections actuated after the printing

of the first item to cause the signal to change from "clear" to "non-clear" position and also actuated after the operation of printing a total to cause the signal to change from "non-clear" to "clear" position.

3. In an adding machine, the combination, with setting up adding and printing mechanism and mechanism for "clearing" the machine, of means affected by the setting up of an item and indicating "clear" and "non-clear" conditions of the adding mechanism, said means comprising a signal arranged to exhibit said "clear" and "non-clear" indications, and connections actuated after the printing of the first item to cause the signal to change from "clear" to "non-clear" position, said connections being controlled by the "clearing" mechanism to cause a restoration of the signal to "clear" position when such latter mechanism is operated.

4. In an adding machine, the combination, with setting up adding and item and total printing mechanism, of a signal device controlled by the setting up mechanism and adapted to indicate "clear" and "non-clear" condition of the machine, and arranged to be shifted from one of said indications to the other after the printing operations for the first item and for the total.

5. In an adding machine, the combination, with setting up, adding and item and total printing mechanism and mechanism for "clearing" the machine, of a signal device under the control of the setting up mechanism and the "clearing" mechanism and arranged to be shifted from one of said indications to the other after the printing operations for the first item and for the total.

6. In an adding machine, the combination, with adding and printing mechanism and mechanism for "clearing" the machine, of a signal normally showing "clear" but tending to move to "non-clear" indication, a signal arm for actuating such signal and pivoted intermediate its length, and two interferences controlled by the machine in its operations and cooperating with said arm on opposite sides of its pivotal point to restrain it.

7. In an adding machine, the combination, with setting up, adding and printing mechanism and mechanism "clearing" the machine, of a signal normally showing "clear" but tending to move to "non-clear" indication, a signal arm for actuating such signal, two interferences cooperating with said arm to restrain its movement to "non-clear" position, means for releasing one interference upon setting up the first item on the machine, and means for releasing the other interference after the printing of such first item.

8. In an adding machine, the combination,

with setting up, adding and printing mechanism and mechanism for "clearing" the machine, of a signal normally showing "clear" but tending to move to "non-clear" indication, a signal arm for actuating such signal, two interferences cooperating with said arm to restrain its movement to "non-clear" position, means for releasing one interference upon setting up the first item on the machine, means for releasing the other interference after the printing of such first item, and means under the control of the "clearing" mechanism for restoring the signal arm and signal to normal or "clear" position.

9. In an adding machine, the combination, with setting up adding and item and total printing mechanism and mechanism for "clearing" the machine, of a signal normally showing "clear" but tending to move to "non-clear" indication, a signal arm for actuating such signal, two interferences cooperating with said arm to restrain its movement to "non-clear" position, means for releasing one interference upon setting up the first item on the machine, means for releasing the other interference after the printing of such first item, and means operated by the "clearing" mechanism after the printing of a total for restoring the signal arm and signal to normal or "clear" position.

10. In an adding machine, the combination, with operating mechanism, printing mechanism and adding mechanism having a series of adding wheels, of mechanism for throwing such wheels into and out of operative relation with the operating mechanism of the machine, and a signal for indicating whether or not the machine is "clear" and controlled by said throw-out mechanism.

11. In an adding machine, the combination with operating mechanism, printing mechanism and adding mechanism including a series of adding wheels, of a rocking lever arranged to control the movement of said wheels to and from operative relation with the operating mechanism of the machine, a signal indicating whether the machine is "clear" or not, and means for bringing said signal to "non-clear" position by the operation of the machine for the first item, said signal being under the control of said lever for restoring the former to "clear" position in the "clearing" of the machine.

12. In an adding machine, the combination, with adding and printing mechanism, and "clearing" mechanism, of a pitman or lever cooperating with the adding mechanism and clearing mechanism, a signal device for indicating whether or not the machine is "clear," and operatively connected with said pitman and arranged to be restored thereby to "clear" position upon a "clearing" operation of the machine.

13. In an adding machine, the combina-

- tion, with setting up adding and printing mechanism and "clearing" mechanism, of a pitman or lever 914 cooperating with the adding mechanism and "clearing" mechanism, a signal device for indicating whether or not the machine is "clear," and normally held against tension to indicate "clear" but released to indicate "non-clear" in the operation of the machine for the first item under control of the setting-up mechanism, said signal being operatively connected with said pitman and arranged to be restored thereby to "clear" position upon a "clearing" operation of the machine.
14. In an adding machine, the combination, with setting up, adding and printing mechanism, and "clearing" mechanism, of a pitman or lever 914 cooperating with the adding mechanism and "clearing" mechanism, a signal device for indicating whether or not the machine is "clear," and normally held against tension to indicate "clear" and means for releasing the signal and permitting it to indicate "non-clear" when the machine is operated for the first item under control of the setting up mechanism, said signal being arranged to be actuated by the pitman in the "clearing" operation of the machine.
15. In an adding machine, the combination with setting up, adding and printing mechanism, and "clearing" mechanism, of a pitman or lever 914 cooperating with the adding mechanism and "clearing" mechanism, a signal device for indicating whether or not the machine is "clear," and normally held against tension to indicate "clear" and means for releasing the signal and permitting it to indicate "non-clear" when the machine is operated for the first item under control of the setting up mechanism, said pitman having a projection for engaging and restoring the signal device to "clear" position upon a "clearing" operation of the machine.
16. In an adding machine, the combination, with setting up, adding and printing mechanism and "clearing" mechanism, of a pitman or lever 914 cooperating with the adding mechanism and "clearing" mechanism, a signal device for indicating whether or not the machine is "clear," and comprising a signal proper having "clear" and "non-clear" indications and a pivoted signal arm operatively connected with the signal, means for releasing the signal and permitting it to indicate "non-clear" when the machine is operated for the first item under the control of the setting up mechanism, said pitman having a projection arranged to cooperate with and actuate the signal arm to "clear" position upon a "clearing" operation of the machine.
17. In an adding machine, the combination, with setting up, adding and printing mechanism and "clearing" mechanism, of a pitman or lever 914 cooperating with the adding mechanism and "clearing" mechanism, a signal device for indicating whether or not the machine is "clear," and comprising a signal proper having "clear" and "non-clear" indications and a pivoted signal arm operatively connected with the signal, means for releasing the signal and permitting it to indicate "non-clear" when the machine is operated for the first item under the control of the setting up mechanism, said pitman being provided with a projection, and an interference carried by one end of the signal arm and arranged to be interposed between such arm and the projection on the pitman, whereby the signal arm is restored to "clear" position upon a "clearing" operation of the machine.
18. In an adding machine, the combination, with setting up, adding and printing mechanism, and "clearing" mechanism, of a pitman or lever 914 cooperating with the adding mechanism and "clearing" mechanism, a signal device for indicating whether or not the machine is "clear," and comprising a signal proper having "clear" and "non-clear" indications and a pivoted signal arm operatively connected with the signal, means for releasing the signal and permitting it to indicate "non-clear" when the machine is operated for the first item under the control of the setting up mechanism, said pitman being provided with a projection, and a pivoted plate or block carried by one end of the signal arm and arranged to be interposed in the path of movement of the projection and to be moved thereby together with the signal arm to normal or "clear" position upon a "clearing" operation of the machine.
19. In an adding machine, the combination, with setting up, adding and printing mechanism and "clearing" mechanism, of a pitman or lever 914 cooperating with the adding mechanism and "clearing" mechanism, a signal device for indicating whether or not the machine is "clear," and comprising a signal proper having "clear" and "non-clear" indications and a pivoted signal arm operatively connected with the signal, means for releasing the signal and permitting it to indicate "non-clear" when the machine is operated for the first item under the control of the setting up mechanism, said pitman being provided with a projection, and a pivoted spring pressed plate or block carried by one end of the signal arm and serving as an interference between such arm and the projection on the pitman, whereby when the machine is "cleared" the signal arm and signal are restored to "clear" position.
20. In an adding machine, the combination, with setting up, adding and printing

mechanism, and "clearing" mechanism, of a pitman or lever 914 cooperating with the adding mechanism and "clearing" mechanism, a signal device for indicating whether or not the machine is "clear", and comprising a signal proper having "clear" and "non-clear" indications and a pivoted signal arm operatively connected with the signal, means for releasing the signal and permitting it to indicate "non-clear" when the machine is operated for the first item under the control of the setting up mechanism, said pitman being provided with a projection, and said signal arm being pivoted intermediate its length, and a pivoted plate or block carried by the lower end of the signal arm, the upper end whereof is operatively connected with the signal, whereby when the machine is "cleared" the pitman will restore the signal arm to "clear" position through the medium of the pivoted plate.

21. In an adding machine, the combination, with setting up, adding and printing mechanism, and "clearing" mechanism, of a pitman or lever 914 cooperating with the adding mechanism and "clearing" mechanism, a signal device for indicating whether or not the machine is "clear", and comprising a signal proper having "clear" and "non-clear" indications and a pivoted signal arm operatively connected with the signal, means for releasing the signal and permitting it to indicate "non-clear" when the machine is operated for the first item under the control of the setting up mechanism, said pitman being provided with a projection, and a spring pressed bell-crank shaped plate pivoted on the lower end of the signal arm, the upper end of which is operatively connected with the signal, one arm of the plate being arranged to serve as an interference between said projection and the signal for the restoration of the latter to "clear" position in the "clearing" operation of the machine.

22. In an adding machine, the combination with setting-up devices, printing mechanism, actuators, and adding wheels arranged to be swung into and out of cooperative relation therewith, of a signal having "clear" and "non-clear" indications, a pivoted signal arm operatively connected therewith and tending to move such signal to "non-clear" position, two interferences arranged to restrain said signal arm, one of such interferences being released when the first item is set up, and a rocking arm 813 controlling the swinging movement of the adding wheels and also arranged to release the second interference.

23. In an adding machine, the combination with setting-up devices, printing mechanism, actuators, and adding wheels arranged to be swung into and out of cooperative relation therewith, of a signal having "clear"

and "non-clear" indications, a pivoted signal arm operatively connected therewith and tending to move such signal to "non-clear" position, two interferences arranged to restrain said signal arm, one of such interferences being released when the first item is set up, and a rocking arm 813 constituting the swinging movement of the adding wheels and arranged to release the second interference after the printing operation of the machine.

24. In an adding machine, the combination with setting-up devices, printing mechanism, actuators, and adding wheels arranged to be swung into and out of cooperative relation therewith, of a signal having "clear" and "non-clear" indications, a pivoted signal arm operatively connected therewith and tending to move such signal to "non-clear" position, two interferences arranged to restrain said signal arm, one of such interferences being released when the first item is set up, and a rocking arm 813 controlling the swinging movement of the adding wheels and operatively connected with and arranged to operate the second interference and thereby release the signal arm from restraint and permit it to indicate "non-clear".

25. In an adding machine, the combination with setting-up devices, printing mechanism, actuators, and adding wheels arranged to be swung into and out of cooperative relation therewith, of a signal having "clear" and "non-clear" indications, a pivoted signal arm operatively connected therewith and tending to move such signal to "non-clear" position, said signal arm having a pin or stud projecting therefrom, two interferences arranged to restrain said signal arm, one of such interferences being released when the first item is set up, and a rocking arm 813 controlling the swinging movement of the adding wheels, the second interference comprising a pivoted lever, one end of which cooperates with the signal arm and the other end of which is operatively connected with said arm 813 and actuated thereby to release the signal arm and permit the latter to move to "non-clear" position.

26. In an adding machine, the combination, with setting up, adding and printing mechanism, of a signal having "clear" and "non-clear" indications, a pivoted signal arm operatively connected therewith and tending to move such signal to "non-clear" position, two interferences arranged to restrain said signal arm, one of such interferences being released when the first item is set up, said signal arm having a projecting stud, the second interference comprising a lever or arm pivoted at one end and with its free end movable in the path of movement of said stud to hold the signal in "clear" position and means for restoring

the signal arm to "non-clear" position when the machine is "cleared".

27. In an adding machine, the combination, with setting-up devices, printing mechanism, actuators, and adding wheels arranged to be swung into and out of coöperative relation therewith, of a signal having "clear" and "non-clear" indications, a pivoted signal arm operatively connected therewith and tending to move such signal to "non-clear" position, two interferences arranged to restrain said signal arm, one of such interferences being released when the first item is set up, said signal arm having a projecting stud 1250^a, and a rocking arm 813 controlling the swinging movements of the adding wheels, the second interference comprising a pivoted arm or lever 1216 operatively connected with the arm 813 and arranged to co-operate with said stud 1250^a and thereby hold the signal in "clear" position until the item or amount has been printed, and means for restoring the signal arm to "non-clear" position when the machine is "cleared".

28. In an adding machine, the combination, with setting-up devices, printing mechanism, actuators, and adding wheels arranged to be swung into and out of coöperative relation therewith, of a signal having "clear" and "non-clear" indications, a pivoted signal arm operatively connected therewith and tending to move such signal to "non-clear" position, two interferences arranged to restrain said signal arm, one of such interferences being released when the first item is set up, and a rocking arm 1216 constituting the second interference, said arm being under the control of the machine in its operations and coöperating with the signal arm to prevent its movement to "non-clear" position until the machine is operated; substantially as described.

29. In an adding machine, the combination, with setting-up devices, printing mechanism, actuators, and adding wheels arranged to be swung into and out of coöperative relation therewith, of a signal having "clear" and "non-clear" indications, a pivoted signal arm operatively connected therewith and tending to move such signal to "non-clear" position, two interferences arranged to restrain said signal arm, one of such interferences being released when the first item is set up, and a rocking arm 1216 constituting the second interference and actuated or rocked by the machine in its operations, said signal arm having a stud with which said arm 1216 coöperates to prevent movement of the signal arm to "non-clear" position until the machine is operated; substantially as described.

30. In an adding machine, the combination, with setting-up devices, printing mechanism, actuators, and adding wheels arranged

to be swung into and out of coöperative relation therewith, of a signal having "clear" and "non-clear" indications, a pivoted signal arm operatively connected therewith and tending to move such signal to "non-clear" position, two interferences arranged to restrain said signal arm, one of such interferences being released by the machine when the first item is set up on the machine, said signal arm having a stud 1250^a, and a rocking arm 1216 constituting the second interference and actuated by the machine in its operations, said arm 1216 being pivoted at one end with its free end adapted to travel in the path of the stud 1250^a and, according to its position, arranged to interfere with such stud and the movement of the signal arm; substantially as described.

31. In an adding machine, the combination with setting up devices, printing mechanism, actuators, and adding wheels arranged to be swung into and out of coöperative relation therewith, of a signal having "clear" and "non-clear" indications, a pivoted signal arm operatively connected therewith and tending to move such signal to "non-clear" position, two interferences arranged to restrain said signal arm, one of such interferences being released when the first item is set up, and a rocking arm 1216 constituting the second interference and actuated by the machine in its operations, said arm 1216 being normally held with a yielding pressure into a position of interference with the signal arm until the machine is operated; substantially as described.

32. In an adding machine, the combination with setting-up devices, printing mechanism, actuators, and adding wheels arranged to be swung into and out of coöperative relation therewith, of a signal having "clear" and "non-clear" indications, a pivoted signal arm operatively connected therewith and tending to move such signal to "non-clear" position, two interferences arranged to restrain said signal arm, one of such interferences being released when the first item is set up, a rocking arm 1216 constituting the second interference and actuated by the machine in its operations, said arm 1216 being pivoted at one end with its free end projecting into proximity to the signal arm to normally interfere with the latter's movements, and a spring connected with the arm 1216 for holding the same in such normal or interfering position; substantially as described.

33. In an adding machine, the combination with setting-up devices, printing mechanism, actuators, and adding wheels arranged to be swung into and out of coöperative relation therewith, of a signal having "clear" and "non-clear" indications, a pivoted signal arm operatively connected therewith and tending to move such signal to "non-clear" position, two interferences arranged to re-

strain said signal arm, one of such interferences being released when the first item is set up, a rocking arm 1216 constituting the second interference and actuated by the machine in its operations, one end of said arm 1216 projecting into proximity to the signal arm to normally interfere with the latter's movements, a main rocking arm 813, and operating connections between the latter and the arm 1216; substantially as described.

34. In an adding machine, the combination, with a keyboard and printing and adding mechanism, of a signal comprising a substantially semi-cylindrical rocking plate bodily shiftable to show "clear" or "non-clear" indications and arranged on the keyboard of the machine, said signal adapted to indicate the fact whether or not the machine is "clear;" and a casing for said signal apertured to alternately expose said indications.

35. In an adding machine, the combination, with a keyboard and printing and adding mechanism, of a signal comprising a substantially semi-cylindrical rocking plate having "clear" and "non-clear" indications and arranged on the keyboard of the machine, a case mounted on the keyboard and within which the signal rocks, said case having a sight opening to exhibit the indications of the signal, and operating connections for the signal to actuate the latter and cause it to indicate the condition of the machine, whether "clear" or not.

36. In an adding machine, the combination, with printing and adding mechanism, of a signal comprising a substantially semi-cylindrical rocking plate having "clear" and "non-clear" indications and arranged on the keyboard of the machine, an arm connected with the signal and extending through the keyboard, an actuating arm, and an operating connection between the actuating arm and said arm on the signal.

37. In an adding machine, the combination with a keyboard, of a clear signal device comprising a substantially semi-cylindrical rocking plate or signal proper having "clear" and "non-clear" indications and arranged on the keyboard of the machine, said signal having trunnions and an operating arm at one end, a case mounted on the keyboard and inclosing the signal and provided with bearings for the trunnions, a pivoted signal arm, and an operating connection between one end of the signal arm and said operating arm of the signal for rocking the latter and causing the same to indicate "clear" or "non-clear" according to the condition of the machine.

38. In an adding machine, the combination with a keyboard and setting-up, adding and clearing mechanism, of a clear signal device comprising a signal proper in the form of a rocking substantially semi-cylindrical

plate having "clear" and "non-clear" indications and mounted on the keyboard of the machine, a signal arm under the control of two interferences, one of which is actuated and released upon the setting up of any item or amount on the keyboard and the other of which is released and after the item or amount is added, means under the control of the clearing mechanism for restoring the signal to normal or "clear" position, and an operating connection between said signal and signal arm.

39. In an adding machine, the combination, with a keyboard, and printing and adding mechanism, of a signal comprising a substantially semi-cylindrical rocking plate having "clear" and "non-clear" indications and arranged on the keyboard of the machine, said signal having trunnions, a case mounted on the keyboard and inclosing the signal and provided with bearings for the trunnions, a pivoted signal arm, and an operating connection between one end of the signal arm and the signal for rocking the latter and causing the same to indicate "clear" or "non-clear" according to the condition of the machine.

40. In an adding machine, the combination with setting-up, adding and printing mechanism and mechanism for "clearing" the machine, of means affected by the setting up of an item for indicating "clear" and "non-clear" conditions of such machine, said means being arranged to change the indication from "clear" to "non-clear" at an advanced stage in the operation of the machine.

41. In an adding machine, the combination with accumulating mechanism and means for clearing the same; of means for indicating "clear" or "non-clear" conditions of said accumulating mechanism, the former indication being automatically effected as an incident to an operation of said means for clearing the accumulating mechanism, and the latter indication being automatically effected as an incident to the first accumulation after such clearing but at an advanced stage in the operation of the accumulating mechanism.

42. In an adding machine, the combination with accumulating mechanism and means for clearing the same; of means for indicating "clear" or "non-clear" conditions of said accumulating mechanism, the former indication being automatically effected as an incident to an operation of said means for clearing the accumulating mechanism, but at an advanced stage in the clearing operation of the machine, and the latter indication being automatically effected as an incident to the first accumulation after such clearing but at an advanced stage in the operation of the accumulating mechanism.

43. In an adding machine, the combination of manipulative amount-determining devices, adding mechanism, clearing mechanism, an index member, means for setting the latter by the clearing mechanism, and means for releasing said index member under the control of the amount-determining means but at an advanced stage in the operation of adding.

44. In an adding machine, the combination of manipulative amount-determining devices, adding mechanism, clearing mechanism, a pivoted index member, means for setting the latter by the clearing mechanism, and means for releasing said index member under the control of the amount-determining means but at an advanced stage in the operation of adding.

45. In an adding machine, the combination of manipulative amount-determining devices, adding mechanism, clearing mechanism, a pivoted spring-drawn index member, means for setting the latter by the clearing mechanism, and means for releasing said index member under the control of the amount-determining means but at an advanced stage in the operation of adding.

46. In a machine of the character described, the combination of adding wheels, actuating racks therefor, means for engaging and disengaging the wheels and racks,

a key for adjusting said means to reverse the order of engagement and disengagement, keys for determining the extent of forward turning of wheels, a spring-held index arm adapted to be rocked by the aforesaid means when adjusted by the first-mentioned key, and a latch for restraining said arm adapted to be displaced by depression of any of the second-mentioned keys.

47. In a machine of the character described, the combination of adding wheels, actuating racks therefor, means for engaging and disengaging the wheels and racks, a key for adjusting said means to reverse the order of engagement and disengagement, keys for determining the extent of forward turning of wheels, a spring-held index arm adapted to be rocked by the aforesaid means when adjusted by the first-mentioned key, a latch for restraining said arm adapted to be displaced by depression of any of the second-mentioned keys, a second latch also restraining the arm, and an actuating element for displacing said second latch.

JESSE G. VINCENT.

Witnesses:

ALVAN MACAULEY,
JOHN McCLELLAND SCOTT.