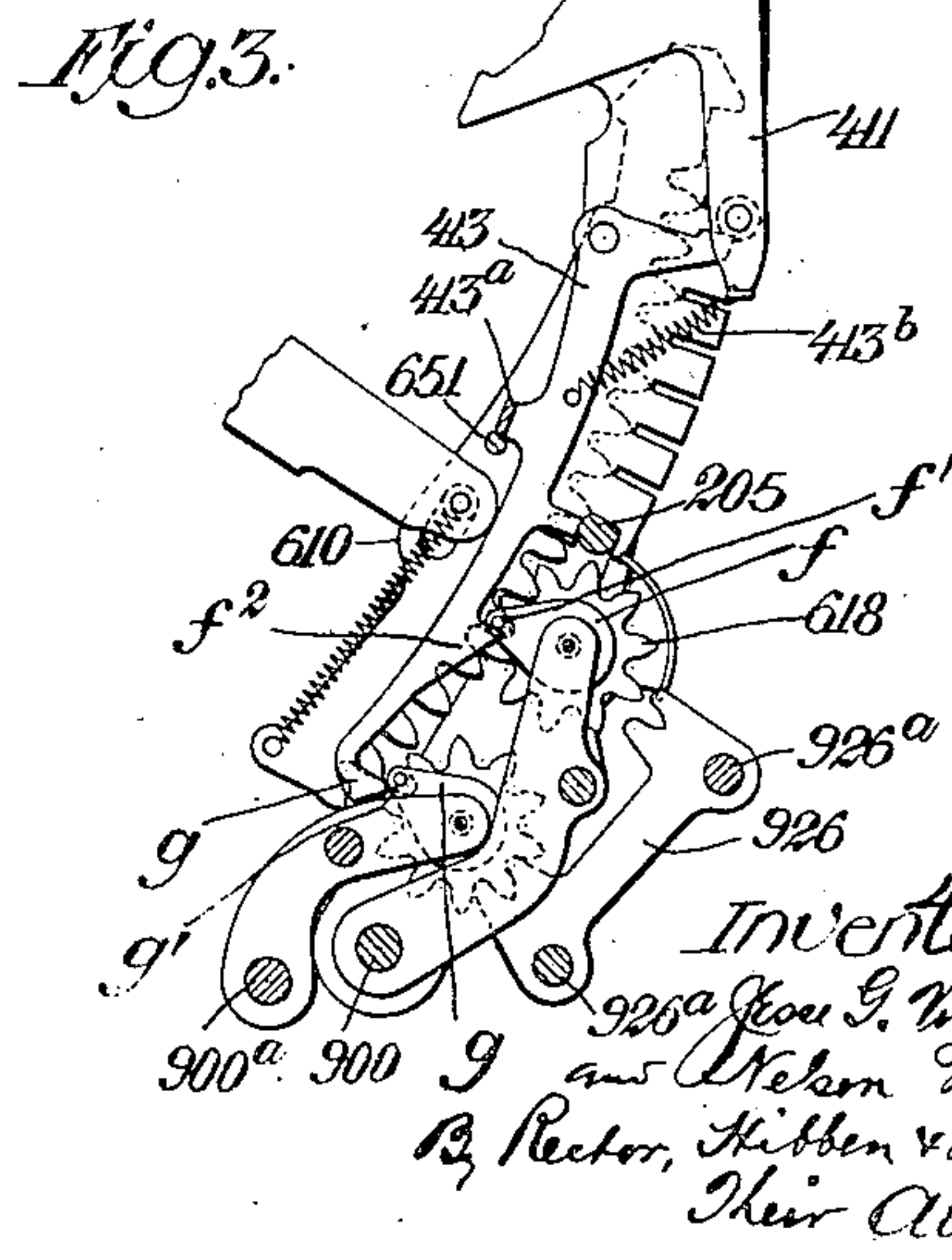
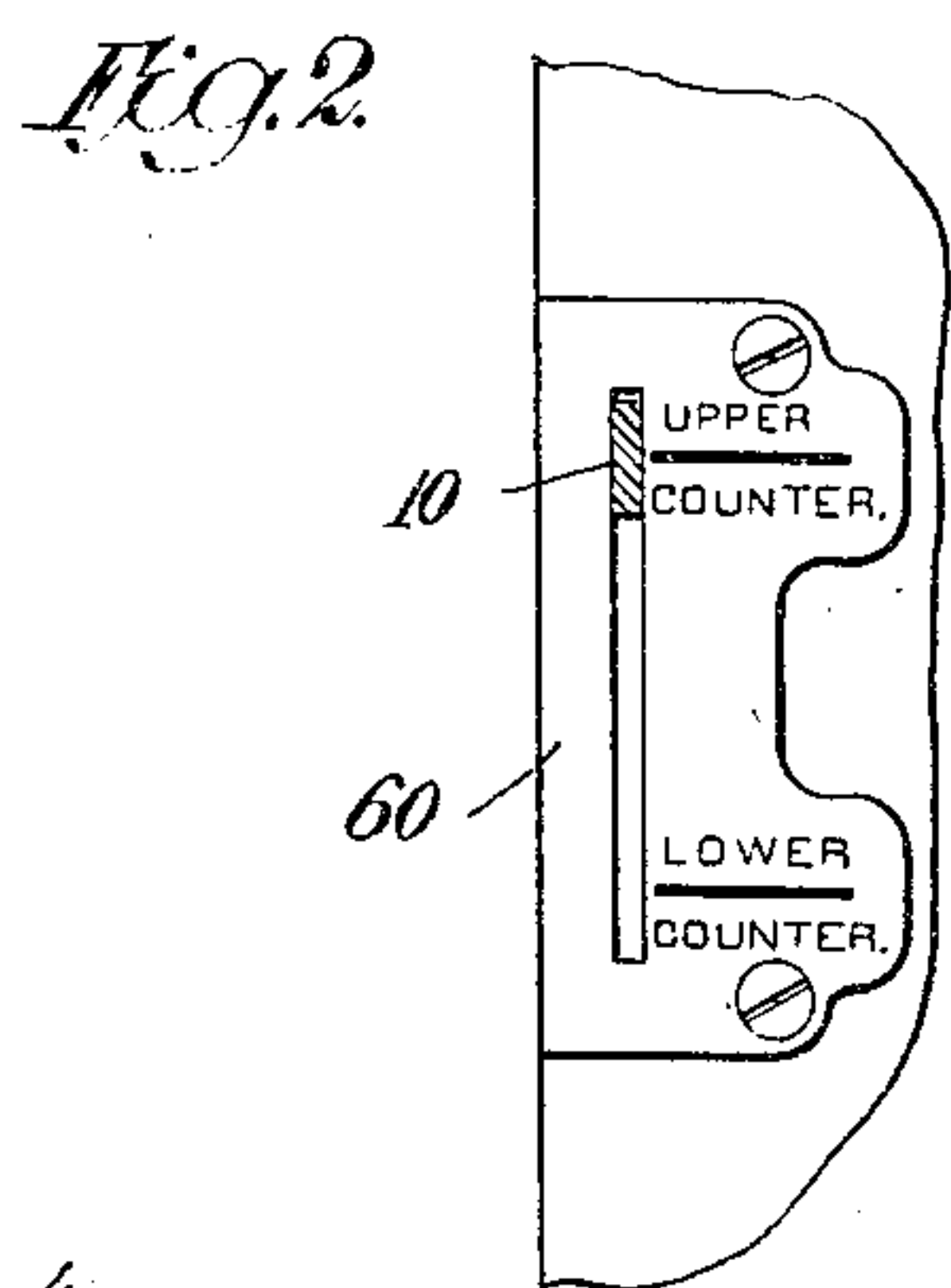


919,656.

6 SHEETS—SHEET 1.



Witnesses
C. Foster
 Louis B. Erwin

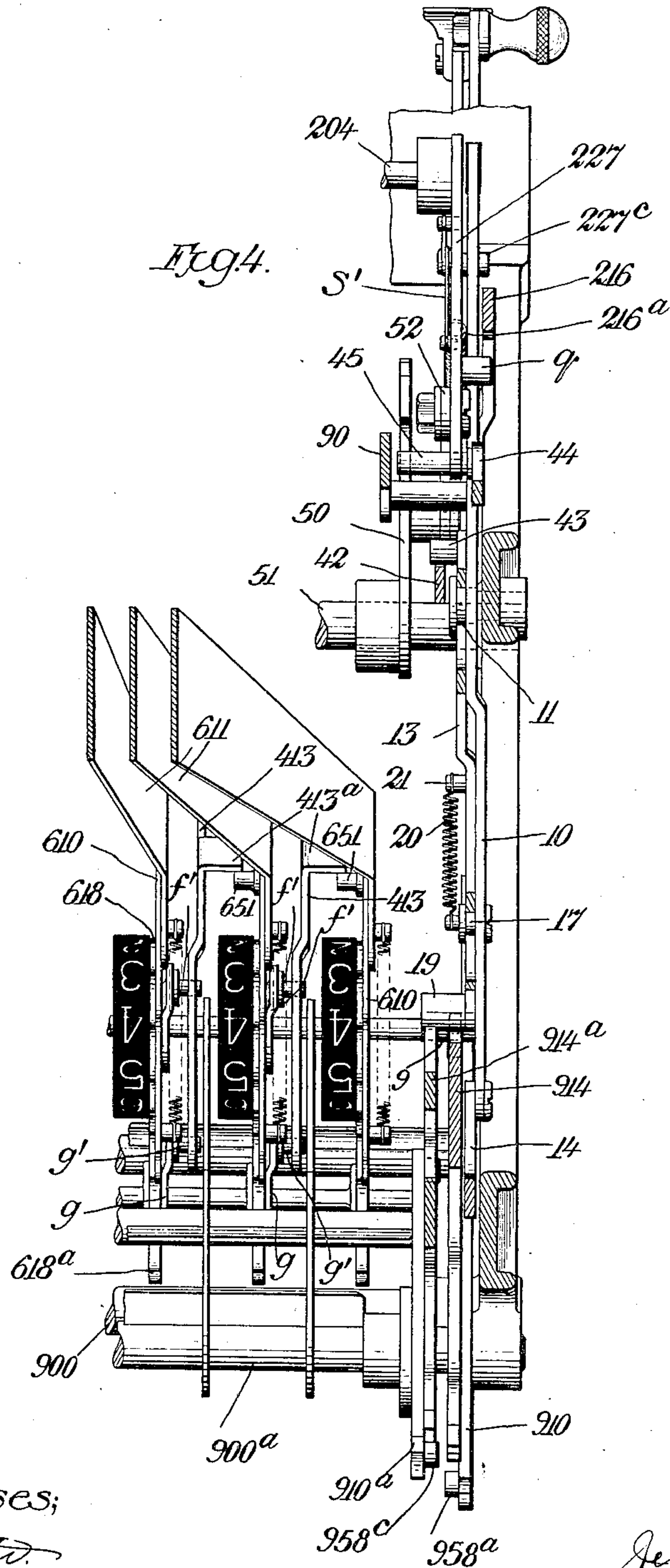
Inventors
926a Joe G. Vincent
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Their Attys.

J. G. VINCENT & N. WHITE.
 ADDING AND LISTING MACHINE.
 APPLICATION FILED OCT. 5, 1908.

919,656.

Patented Apr. 27, 1909.

6 SHEETS—SHEET 2.

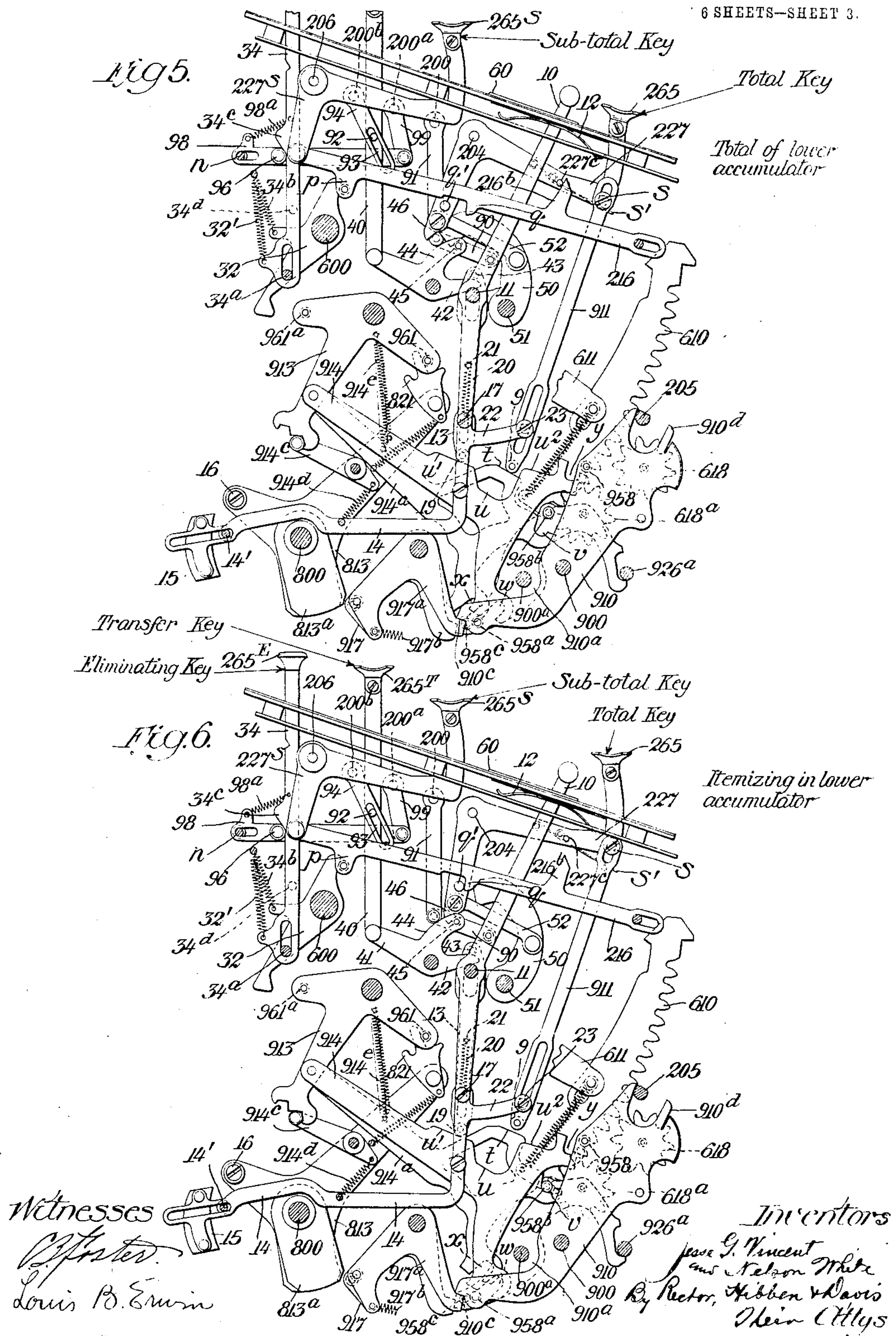


Witnesses;
[Signature]
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Inventors
 Jesse G. Vincent
 and Nelson White
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 Their Attys.

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6 SHEETS—SHEET 3.

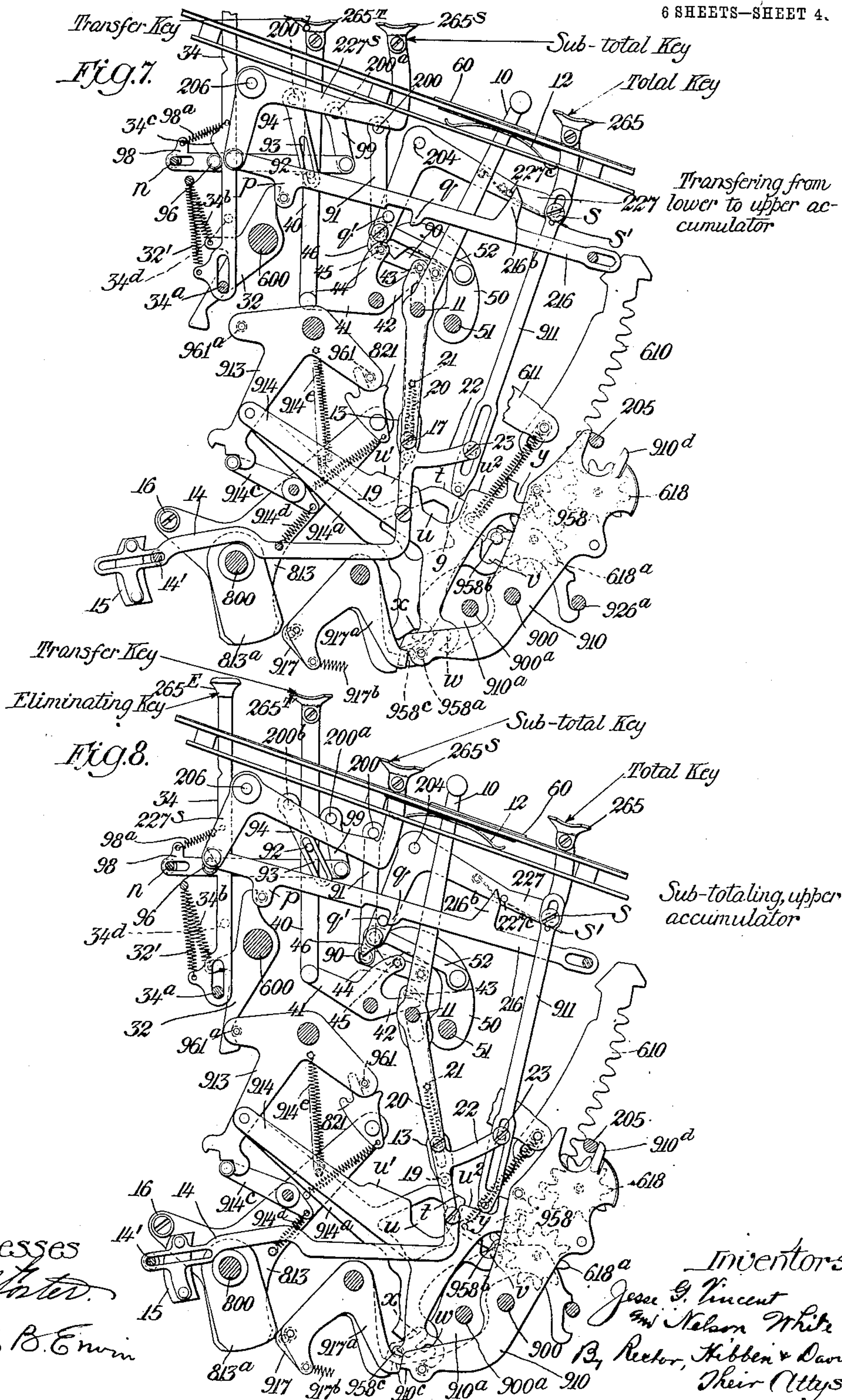


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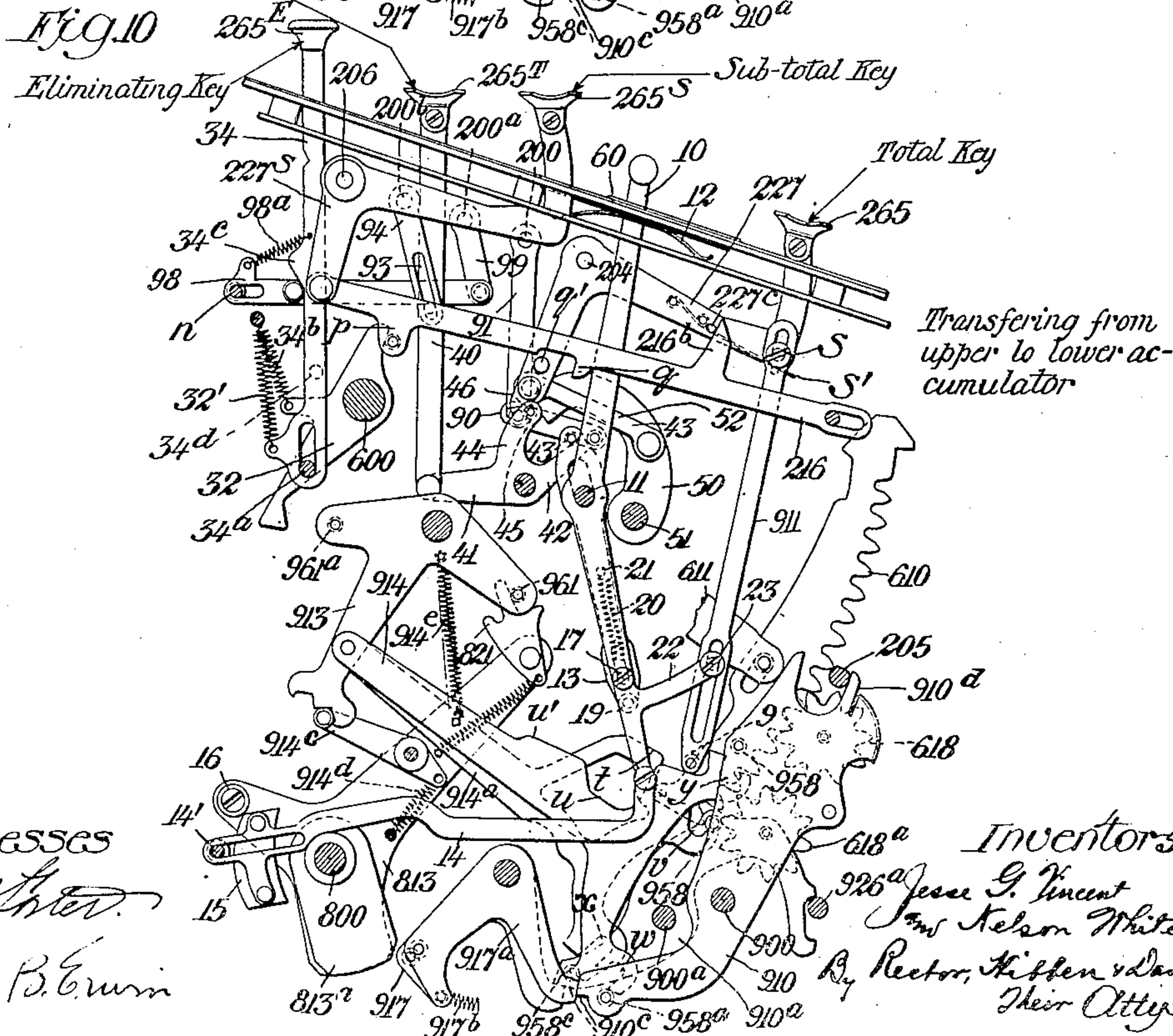
6 SHEETS—SHEET 4.



APPLICATION FILED OCT. 5, 1908.

Patented Apr. 27, 1909.

6 SHEETS—SHEET 5.



Louis B. Gruen

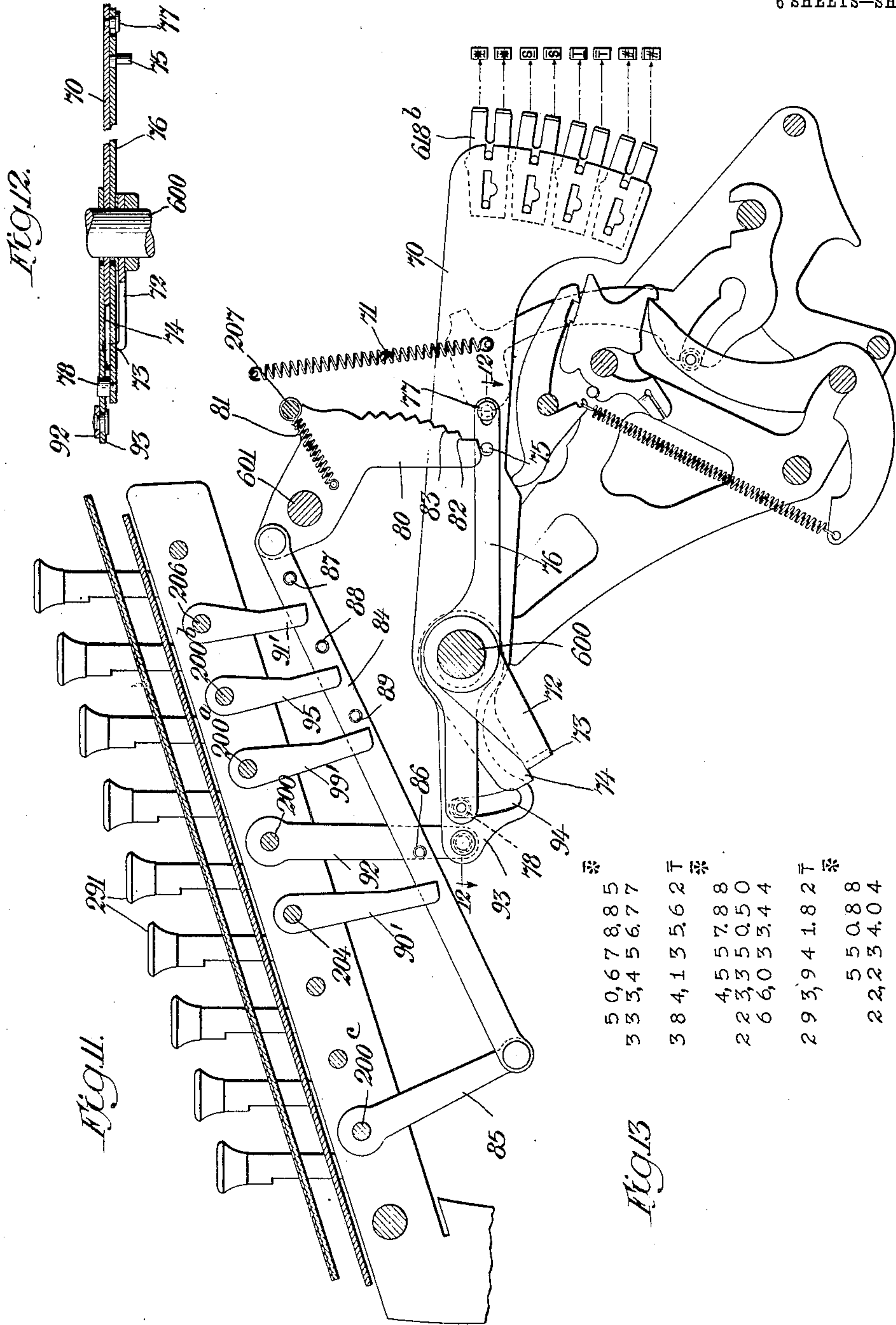
926^a Jesse G. Vincent
Jas Nelson White
By Rector, Kibben & Davis
Their Attys.

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919,656.

Patented Apr. 27, 1909.

6 SHEETS—SHEET 6.



50,678,85	333,456,77	384,135,62	455788	22335050	6603344	293,941.82	55088	22234.04	22784.92	70086236

Witnesses

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Inventors

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UNITED STATES PATENT OFFICE.

JESSE G. VINCENT AND NELSON WHITE, OF DETROIT, MICHIGAN, ASSIGNORS TO BURROUGHS
ADDING MACHINE COMPANY, OF DETROIT, MICHIGAN, A CORPORATION OF MICHIGAN.

ADDING AND LISTING MACHINE.

No. 919,656.

Specification of Letters Patent.

Patented April 27, 1909.

Application filed October 5, 1908. Serial No. 456,272.

To all whom it may concern:

Be it known that we, JESSE G. VINCENT and NELSON WHITE, citizens of the United States, residing at Detroit, in the county of Wayne and State of Michigan, have invented certain new and useful Improvements in Adding and Listing Machines, of which the following is a specification:

The present invention relates to that particular type of adding and listing machine in which more than one accumulator or set of adding wheels is employed so that successive totals can be struck and at the same time a grand total preserved. Reference may be had to the Swalm patent No. 885,202, issued April 21, 1908, for an example of such type of adding and listing machine.

The present invention aims to provide improved means for controlling the accumulators whereby either of two accumulators can be used at will for the purpose of successively accumulating items and a total of such accumulated items on either set of wheels can be struck leaving such wheels at zero or retaining the accumulation for addition thereto of further items if desired. Provision is further made for transferring an accumulation at will from either accumulator to the other, and in the same operation printing the transferred accumulation. Then any total of successively transferred accumulations can be printed with or without leaving the wheels at zero.

In evolving the present invention it has been the constant aim to produce an entirely practical arrangement for performing such functions as above referred to, and so the manipulation required of the operator is made very simple, plain and direct, while at the same time safe-guards are provided to prevent improper manipulation such as would be productive of anomalous results in calculation. Thus a single manipulative device is provided such as a simple lever to be thrown to one extreme or the other of its movement, which device determines which set of accumulating wheels shall come into play under control of the usual manipulating devices of an adding and listing machine such as the depressible amount keys and the special keys which are usually designated total, sub-total, elimination, correction and repeat keys. Then an additional manipulative device, for example a simple depressible key, will be provided for so modifying the

action of the accumulator controlling mechanism as to provide for transferring an accumulation from one accumulator to another. The safe-guards referred to take the form of interlocking devices to prevent manipulation when an operation of the machine is under way and to prevent operating the machine with controlling devices only partially manipulated.

The invention is here shown as applied to an adding and listing machine of the well-known Burroughs type as in the case of the Swalm invention above mentioned but it is to be understood that the invention is not necessarily limited to this particular application of it as its essential features might be incorporated in adding and listing machines of this or modified types.

In the drawings which accompany and form part of this specification Figure 1 represents the machine in sectionalized left side elevation with all parts at normal; Fig. 2 shows a fragmentary top plan view of the keyboard with a certain controlling lever in cross section; Fig. 3 is a vertical section taken from front to rear of a portion of the machine illustrating transfer or carrying mechanism; Fig. 4 is a cross section taken substantially on line 4—4 of Fig. 1; Figs. 5 to 10 are similar sectionalized left side elevations illustrating various conditions of the working parts according to the accounting function being performed by the machine; Fig. 11 is a partial sectionalized right side elevation of the machine illustrating certain special printing devices; Fig. 12 is a horizontal section on line 12—12 of Fig. 11; and Fig. 13 shows an example of work.

Amount keys 291 of the usual arrangement are adapted as usual to displace latches and release segmental racks 610 which have slot-and-pin-and-spring connections with levers 611 loose on a central rock shaft 600 which carries a restoring frame or bail 613 to lift the front ends of the levers. The rear ends of the latter carry the usual segmental series of amount type plates 618' adapted to be driven against a roller platen 17 on a shifting carriage 17^a. The said amount keys set stops to limit the downward movement of the racks so as to bring the proper types to the printing line and provide for correspondingly advancing adding pinions. In the present instance there are two sets of pinions 618 and 618^a arranged in tandem, and the

racks 610 are made longer than usual so as to cooperate with the pinions 618^a as well as the pinions 618. Each set of pinions is supported in a rocking frame, the numeral 910 designating the left side piece of the frame supporting the upper pinions 618 and 910^a designating the left side piece of the frame supporting the lower pinions 618^a, while numerals 900 and 900^a designate the pivot shafts of these frames respectively above and below which shafts said left side frame-pieces extend. The frame-piece 910 has inwardly projecting studs 958 and 958^a at points above and below the pivot shaft 900 and the frame piece 910^a has similar stubs 958^b and 958^c above and below the shaft 900^a. There is a pitman provided for each of the rocking frames, that which cooperates with the upper accumulator frame being designated 914 and that which cooperates with the lower accumulator frame being designated 914^a. Each of these pitmen is branched at the forward end somewhat similarly to the usual pitman employed in Burroughs machines, but the formation for co-action with the frame stud differs. Thus the lower branch of each pitman instead of being simply hook-shaped to engage over the front side of the lower frame stud is notched so as to engage over both sides of the stud.

The reference letter *w* designates the notch of the pitman 914 adapted to co-act with the stud 958^a and the reference letter *x* designates the notch of the pitman 914^a, which notch co-acts with the stud 958^c. The upper branches of the pitman are also notched to co-act with studs 958 and 958^b respectively, the reference letter *y* designating the notch of the pitman 914 and the reference letter *v* the notch of the pitman 914^a. In each case the rear side of the notch is made higher than the front side so that although the front side may be out of line with the stud the rear side can still cooperate with the stud.

The two pitmen above described are pivotally connected on a common center 914^b to the depending arm of a three-armed lever 913 quite similar to the usual Burroughs lever though in the present instance the depending arm is extended farther downward and given a V-formation along its lower edge to cooperate with a detaining arm 914^c pivoted upon a stud on the main frame and held to active position by a spring 914^d. The three-armed lever is rocked as usual by an arm 813 which carries at its upper end a spring-held wipe pawl or plate 821 for cooperating alternately with studs 961 and 961^a on the forwardly and rearwardly projecting arms of said lever. In the present instance besides the usual downwardly-projecting portion of said arm 813 which cooperates with the locking lever 917, there is secured to the rock shaft 800 an additional arm or plate 813^a which co-

operates with a similar lever 917^a, the latter co-acting with the accumulator frame-piece 910 in the same manner that the lever 917 co-acts with the accumulator frame-piece 910^a. In each case the frame-piece is formed with the usual V-end 910^c and the locking lever has a similar formation and is kept in engagement with the frame-pieces by springs 917^b either of which will yield when the corresponding accumulator frame is rocked. Said locking levers act as usual to enforce full movements of the accumulator frames and to prevent rebound or undue movements thereof.

The pitmen are connected by springs 914^e with the three-armed lever 913, which springs tend to engage the notched upper branches with the studs 958 and 958^b respectively but normally, *i. e.*, when the upper accumulator is to be used for itemizing purposes, only the notch *y* embraces its stud 958, the pitman 914^a being prevented from rising far enough to cause its notch *v* to embrace the stud 958^b, which condition is illustrated in Fig. 1 where the upper accumulator pinions 618 appear in mesh with the racks as the usual adding pinions of a Burroughs machine normally stand. The lower accumulator pinions 618^a are on the contrary disengaged from the racks and so long as the pitman 914^a maintains the intermediate position shown in Fig. 1 said pinions 618^a will remain so disengaged, the front side of the notch *v* being prevented from operating upon the stud 958^b and the notch *x* being wholly above the stud 958^c. These conditions can be reversed by permitting the pitman 914^a to rise and constraining the pitman 914 to assume the intermediate position as illustrated in Fig. 6.

Which pitman shall be free to engage its pinion frame and rock the pinions back and forth while the other pitman occupies the intermediate position, is determined by the position of a lever 10 which projects through a slot in the keyboard preferably to the left of the amount keys where it is suitably equipped for manipulation. This lever is pivoted intermediate its ends upon a stud 11 which projects from the left hand side frame of the machine, said stud also supporting and guiding a slide piece 13 lying against the inner side of the lever and drawn downward by a spring 20 which connects a stud 21 on the slide piece with a screw stud 17 entered through the lever and engaging a slot in the lower part of the slide piece as shown in dotted lines in Fig. 1. (See also Fig. 5). At its lower extremity said slide piece carries a roller 19 long enough to extend over the upper edges of both the pitmen and these upper edges are so formed that when the lever is at one extreme position the roller will permit one pitman to maintain the elevated position

and will hold the other depressed to the intermediate position, the spring 20 being stronger than either of the springs 914^e. Thus the pitman 914 is formed in its upper edge with a depression *u* and just in rear thereof with a raised portion *u'* and the pitman 914^a is formed with a raised portion *t* in lateral alinement with the depression *u* of the pitman 914.

When the handle end of the lever is rearward as in Fig. 1 and the lower end of the lever forward the roller 19 bearing upon the raised edge *t* of the pitman 914^a holds the latter to the intermediate position hereinbefore described whereas said roller being then over the depression *u* of the pitman 914 the latter is free to rise and embrace the stud 958. On the other hand when the handle end of the lever is forward as shown in Figs. 5 and 6 the roller 19 engages the raised edge *u'* of the pitman 914 holding the latter to the intermediate position and said roller having passed to the rear of the raised portion *t* of the pitman 914^a the latter may rise to embrace the stud 958^b as illustrated in Fig. 6. In either case itemizing operations can be carried on in the same manner as with an ordinary Burroughs machine, the set of pinions normally engaged with the racks being first moved out of engagement and so held while the racks descend and then being re-engaged and so held while the racks rise. The edge of the pitman 914 is rounded off and inclined where it rises from the depression *u* to the raised part *u'*, and the edge of the pitman 914^a is similarly formed where it rises to the portion *t*, so that the roller 19 will have an easy action when the lever is shifted to depress either pitman. A friction spring 12 is preferably mounted on the lever 10 just under the keyboard and by pressure on the lower keyboard plate is adapted to retain the lever in either adjusted position and guard against accidental displacement, said lower keyboard plate being preferably recessed for engagement of the curved extremities of the spring. Provision is furthermore made for positively locking the lever in either of its adjusted positions once an operation of the machine has started and until such operation concludes. To this end a link or bar 14 is pivotally connected to the lower extremity of the lever and extends rearward above the shaft 800 and beyond the same where it is slotted to embrace a fixed stud 14' on the frame-work. This link or bar carries a curved locking block 15 adapted to cooperate with a roller 16 on a branch of the rocking arm 813. Normally the upper squared edge of the block is just below said roller so that the hand lever 10 can be moved back and forth. The rear curved edge of the block is normally just forward of said roller and it results that when an operation of the machine starts, the arm 813 rocking rear-

ward, the roller 16 will pass behind the block 15 and so remain until just at the close of the operation when the roller resumes its normal position. It follows that during the machine's operation the hand lever 10 cannot be moved forward. Neither can it be moved rearward during such operation after having been previously adjusted to the forward position shown in Figs. 5 and 6, because then the block 15 has taken up a position to the rear of the roller 16, the latter passing down in front of the block will prevent movement of the hand lever.

The taking of a total from either of the accumulators is done much as in an ordinary Burroughs machine, that is to say the pitman which has been moving the pinions back and forth for itemizing purposes will be fully lowered so as to engage it with the lower stud of the accumulator frame with the result that the pinions remain engaged with the racks during the descent of the latter and are then disengaged by reason of the action of the pitman on the lower stud unless the wipe pawl 821 is disabled as hereinafter explained for the purpose of keeping the pinions engaged throughout the operation as when taking a sub-total. The means for so depressing either pitman are dependent as to adjustment upon the adjustment of the hand lever 10 and the pitmen are especially formed to provide for such depression of either pitman without affecting the other. A bell crank total key lever 227 is employed of much the usual kind and there is a thrust bar 911 which performs the function of the link ordinarily used to connect the bell crank total key lever with the pitman. This thrust bar is slotted at its upper end to embrace a screw stud *s* on the lever 227 and at its lower end carries a roller 9 which is long enough to extend over the upper edges of both of the pitmen. The pitman 914 has a raised portion *u'* just forward of the depression *u* over which raised portion the roller 9 normally stands as shown in Fig. 1 and depression of the total key under such circumstances results in thrusting said pitman downward to the position shown in Fig. 9 which it will be noted brings the lower branch of the pitman just forward of the notch *w* to bear upon the stud 958^a. The stud *s* has then moved to the lower end of the slot in the thrust bar 911 and a flat spring *s'*, secured to the lever 227 and bearing upon a pin of the thrust bar, is flexed so that when the pitman moves forward and the notch *w* is carried over the stud 958^a the pitman will be thrust farther down, said flat spring being superior to the spring 914^a. The notch *w* being thus forced to embrace said stud it is obvious that unless the disabling means heretofore referred to should come into play, the rearward movement of the pitman at the time the operating handle starts back, will cause the pinions 618 to be

disengaged from the racks. The upper edge of the other pitman 914^a drops off abruptly in front of the raised portion *t* so that the roller 9 moves down without touching said pitman 914^a. However, if the total is to be taken from the lower accumulator the said roller 9 should of course act upon said pitman 914^a. Therefore means are provided for swinging the thrust bar 911 rearward when the lower end of the lever 10 moves rearward. Said lever has a branch 22 with a roller stud 23 projecting into a longitudinal slot of the bar 911. Consequently when the handle end of said lever is drawn forward and the roller-bearing end correspondingly swung rearward the thrust bar 911 will also be swung rearward. This is of course done while the total key is elevated and results in carrying the roller 9 over the raised portion *t* of the pitman 914^a as shown in Fig. 6 and the movement is sufficient to take said roller above the depression *u* of the other pitman 914. Consequently depression of the total key 265 will then result in lowering the pitman 914^a without affecting the pitman 914 as illustrated in Fig. 5 and the same coöperation then takes place between the notched lower branch of said pitman 914^a and the stud 958^c as previously described with reference to the notched lower branch of the pitman 914 and the stud 958^a. Of course when the handle lever 10 is again moved rearward the roller 9 resumes position over the raised portion *u*² of the pitman 914.

If the upper pinions 618 happen to be in mesh with the racks at a time when it was desired to take a total from the lower set of pinions then disengaged from the racks, it would of course be necessary to disengage the upper pinions and engage the lower pinions with the racks at the outset of the operation before the racks started to descend. The positioning of the hand lever 10 forward results in depressing the pitman 914 to the intermediate position as already described, in which position the high rear side of the notch *y* is still behind the stud 958. Consequently the upper pinions will be moved out of mesh with the racks the same as in an itemizing operation. Now the lower pinions being disengaged from their racks the stud 958^c would be standing directly in line with the notch *x* in the lower branch of the pitman 914^a. Consequently, depression of the total key would cause said pitman to embrace said stud with the result that the forward thrust of the pitman would not only disengage the upper pinions from the racks but rock the frame 910^a so as to engage the pinions 618^a with the racks at the outset of an operation and of course under these conditions the rearward movement of the pitman would disengage the lower pinions from the racks at the middle of the operation. So in the case of desiring to take a total from the up-

per accumulator when it happens to be disengaged from the racks and the lower accumulator engaged with the racks as in Fig. 5, the rearward movement of the handle lever causes the pitman 914^a to take up the intermediate position in which the rear side of its upper notch is still behind the stud 958^b so that as the operation starts the lower accumulator frame will be rocked to disengage the pinions from the racks. The lower notch *w*, of the pitman 914 is in line with the stud 958^a so that lowering of the pitman by the total key engages it with said stud and the upper accumulator will be rocked into engagement with the racks at the outset of the operation and out of engagement before the racks start to return.

When a sub-total is desired the total key lever 227 is not depressed by means of its key 265 but a second bell crank lever 227^s is operated by finger pressure on a key 265^s. This has the same effect as rocking of the lever 227 by finger pressure on the key 265 for there is connected to the lever 227^s a bar 216 which extends forward along the lever 227 and has a lug *q* which acts rearwardly against a stud *q'* on said lever 227. But operation of the lever 227^s also has the effect of disabling the wipe pawl 821 in its rearward position. To this end said bar 216 is formed with a second lug *p* carrying a roller stud to act upon the upper end of a lever 32 which is pivoted intermediate its ends on the shaft 600. The lower arm of this lever is formed to swing against the stud 961^a when the lever is rocked by the bar 216, and present an edge to the wipe pawl 821 which prevents said pawl coöperating with said stud 961^a, see Fig. 8. A spring 34^b normally upholds said lever 32 and a spring 216^a normally holds the bar 216 forward and the key 265^s elevated. It will be obvious that the disablement of the wipe pawl 821 at the rear position prevents forward movement of the pitmen and consequently when either set of pinions has remained in mesh with the racks during their descent it will not be disengaged when the racks ascend.

Elimination of an item from either accumulator when it is desired to print without adding, as when using a clerk's designating number or the like, is also done by disabling the pawl 821 at its rear position and the same lever 32 is utilized to this end. The elimination key 265^e is mounted on the upper end of a stem 34 which is suitably guided by slots in the keyboard plates and by a frame stud 34^a engaging a slot in said stem. Said key is normally upheld by a spring 32' connecting its stem with the same frame stud which supports one end of the spring 34^b. A stud 34^d on the stem 34 extends above the spring-supporting arm of the lever 32 and when the key is depressed said stud will rock the said lever to effective position. In

this case the adjustment of the machine is an itemizing one so that when the arm 813 reaches its rearward position neither accumulator is in mesh with the racks. The disablement of the wipe pawl by depression of said key will obviously cause the accumulator, which otherwise would reengage the racks, to remain disengaged and the item which is printed will not be added.

10 In order to provide for transferring an accumulation from one set of pinions to the other it is necessary that the former shall remain engaged with the racks during their descent and the other set of pinions then engage with the racks so as to be turned forward to the same extent that the first set of pinions has been turned backward and the latter should be disengaged from the racks before the return movement of the same sets in. To bring about such result a special key 265^T is provided, the same surmounting the upper end of a stem 40 which slides through the keyboard plates and at its lower end is pivotally connected to a lever 41 mounted on a suitable frame stud and branched in front of the same, the lower branch 42 extending under a stud 43 on the slide-piece 13 so that depression of the key will result in lifting said slide-piece against the stress of the spring 20. The upper branch 44 of said lever carries a stud 45 which extends in front of a nose 46 of the total key bell crank lever 227, all as shown in Fig. 1, so that depression of said key 265^T also results in operating the total key lever. Now the lever 10 must be set to the lower accumulator position when the transfer is to be made from that to the upper end, and vice versa, must be set to the upper accumulator position when the reverse operation is to be performed. In Fig. 7 the parts are shown relatively positioned as when said key 265^T has been depressed at a time when the lower accumulator pinions were in mesh with the racks and the handle lever 10 forward. With said handle lever so positioned prior to depression of the key 265^T the pitman 914 would be held by the roller 19 to the intermediate position as illustrated in Fig. 6. But depression of said key lifts said roller 19 and frees said pitman so that upon moving forward its notched upper branch may spring up into engagement with the stud 958 and draw the upper set of pinions into mesh with the racks when the handle of the machine starts rearward. Depression of the key 265^T by operating the total key lever 227 has depressed the pitman 914^a so as to disengage its upper branch altogether from the stud 958^b and bring its lower branch to bear upon the stud 958^c as shown in Fig. 7. Consequently, when this pitman 914^a moves forward the lower pinions are not disengaged from the racks but measure the downward movement of the same, and the

lower notch of this pitman becomes engaged with the stud 958^c so that said lower pinions will be disengaged from the racks as the handle of the machine starts rearward. Obviously this results in the accumulation 70 which was on the lower pinions being passed to the upper pinions and the lower pinions being left at zero. If at the time it was desired to pass the accumulation from the lower to the upper set of pinions the latter 75 happened to be in mesh with the racks the lever 10 would first be thrown to the lower accumulator position and this would have the effect of releasing the pitman 914^a and moving the pitman 914 to the intermediate 80 position, of course bringing the total key roller 9 over the pitman 914^a. Then when the key 265^T was depressed the retraction of the roller 19 would release the pitman 914, thereby permitting it to reengage the stud 85 958, so that in the ensuing operation the upper set of pinions would first be disengaged with the racks and then reengaged as in an itemizing operation, whereas the lowering of the thrust bar 911 would engage the 90 lower branch of the pitman 914^a with the stud 958^c and cause the pinions 618^a to be first engaged with the racks and then disengaged leaving them at zero and causing the accumulation to pass to the upper pinions. 95

Transfer of accumulation from the upper to the lower pinions comes about in much the same way. Assuming said upper pinions to be already in mesh with the racks and the lever 10 to be in the position for itemizing 100 on said upper pinions depression of the key 265^T releases the pitman 914^a and disengages the upper branch of the pitman 914 from the stud 958 with the result that the forward movement of the pitman 914 does not rock 105 the upper accumulator frame so its pinions remain engaged with the racks during their descent, but as in the regular totaling operation said pinions will be disengaged as the handle starts rearward. The other pitman 110 914^a having been released its upper branch will engage the stud 958^b when the pitman moves forward and so upon rearward movement will engage the lower pinions with the racks. In case the lower pinions happen to 115 be engaged with the racks at the time it is desired to transfer an accumulation from the upper pinions to the lower pinions movement of the handle lever 10 to the upper accumulator position would result in depressing the pitman 914^a to the intermediate 120 position and moving the total key roller 9 over the edge u^2 of the pitman 914. Depression of the key 265^T would release the pitman 914^a permitting it to reengage the 125 stud 958^b and would depress the pitman 914 into engagement with the stud 958^a, with the result that the lower pinions would first be rocked out of engagement with the racks and the upper pinions into engagement with 130

the racks and then when the racks had descended distances measured in extent by the upper pinions, the latter would be left at zero and the accumulation transferred to the lower pinions.

In order to prevent depression of the sub-total key either when the total key has been directly depressed or drawn down by depression of the transfer key 265^r, the bar 216 is formed with an upstanding finger 216^b in rear of which a pin 227^c on the total key bell crank lever passes whenever said lever is operated either directly or by the transfer key.

In order to prevent depression of the transfer key when either the total or sub-total key has been directly depressed the total key lever is connected by a link 52 with a curved locking arm 50 pivoted on a rock shaft 51. Depression of the total key rocks this arm rearward and downward and the upper branch 44 of the lever 41 has a stud 45 in rear of which said locking arm is adapted to pass.

Where the accumulator controlling lever 10 projects through the keyboard there is secured upon the latter a slotted index plate 60 (Fig. 2) which is suitably inscribed as with the words "Upper counter" and "Lower counter" alongside opposite ends of the slot. Whenever itemizing is to be done in the upper counter or accumulator or a total or sub-total taken from that counter or an accumulation passed from that counter, the lever should be positioned opposite the inscription "Upper counter". Correspondingly whenever itemizing is to be done in the lower accumulator or counter or a total or sub-total taken therefrom or its accumulation passed to the upper counter the lever should be positioned opposite the inscription "Lower counter."

The carrying of tens is effected in each accumulator either when itemizing or receiving an accumulation from the other accumulator, through the same character of means as employed in the regular Burroughs machine though in the present instance one set of transfer pawls is utilized for both accumulators. The racks 610 carry studs 651 as usual normally engaged by laterally-turned portions 413^a of transfer pawls 413 (Fig. 3), the latter being pivotally mounted and drawn forward against a stop shaft 205 by springs 413^b which connect them with the usual latches 411. Said pawls are elongated to extend in rear of both sets of pinions, there being a pawl for each vertically aligned pair of pinions of the two sets. The pinions 618 carry disks *f* with laterally-projecting studs *f'* to act against inclined lugs *f''* on the forward sides of the pawls 413 somewhat above their lower ends. At their lower extremities said pawls have inclined projections *g* to be acted upon by laterally-projecting pins *g'* of disks *g''* secured to the

pinions 618^a respectively. It will thus be obvious that pinions of either set—which ever happens to be engaged with the racks—may operate to displace the transfer pawls and cause transfer or carrying movements of racks to ensue. The upper edges of the projections *f''* constitute zero stops for the upper pinions and the similar edges of the lower projections *g* constitute zero stops for the lower pinions.

The pinions are prevented from accidental turning when disengaged from the racks by reason of their engagement with teeth of plates 926 mounted upon cross rods 926^a, there being teeth at both ends of the plates, one set to engage with the upper pinions and the other with the lower pinions. The rocking of the upper accumulator frame is limited by the abutment of a bifurcated portion 910^d of the side plate 910 against the cross rod 205 and the vibrations of the lower accumulator frame are limited by one of the cross rods 926^a which extends between a bifurcation of the frame side piece 910^a as shown in Fig. 1.

Listing of items and printing of totals is effected through the usual impression means which need not be described, being fully disclosed in the Swalm patent heretofore mentioned and in other prior patents referred to in the specification of the Swalm patent. In the present instance provision is made for characterizing totals, sub-totals, transferred accumulations and eliminated items taken from one counter to distinguish the same from totals, sub-totals, transferred accumulations and eliminated items taken from the other counter. To this end as shown in Fig. 11 a special type carrier 70 is mounted on the shaft 600 to the right of the regular amount type carriers, this special type carrier having a segmental series of type plates 618^b, each with two type faces, duplicates of each other except that a line is below the character on one type face and above it on the other. Thus the upper type plate which is used to designate a total has two type faces each with a star and one with a line below the star and the other with a line above the star as clearly shown in Fig. 11. So the next lower type plate has two type faces each with the capital letter "S" but the upper one having a line below the "S" and the lower one having a line above the "S". The next lower type plate has two type faces, each with the letter "T" and the upper one with the line below the letter and the lower type face with the line above it. The lowermost type plate has two type faces each having a number sign but the upper one having a line below the number sign and the lower one having a line above the same. The types having the lines above the symbols come into play in connection with the upper accumulator and the types with the

lines below the symbols come into play in connection with the lower accumulator. A spring 71 tends to raise the special type carrier but normally an arm 72 secured to the rock shaft 600 resists said spring, said arm having a laterally-turned end portion 73 engaging under an extension 74 of the type carrier on the forward side of the shaft 600. Furthermore when itemizing is going on the type carrier is prevented from moving by reason of the engagement of a stop pin 75 on the type carrier with the lower edge of a plate 80 which is pivotally mounted upon a cross shaft 601, said plate being normally held up against another cross shaft 207 by a spring 81. The stop pin 75 is not mounted directly on the type carrier but on a sliding bar 76 slotted to embrace the shaft 600 and also slotted to embrace a stud 77 on the type carrier. The position of this slide bar determines whether or not in an operation other than itemizing, the special types having the lines above the symbols shall come into play or those having the lines below the symbols. When the slide bar is rearward the former come into play and when the slide bar is forward the symbols having the lines below them come into play. The position of the slide bar is determined by the adjustment of the hand lever 10. Said lever is connected by a link 90 (Fig. 1) with an arm 91 which is secured to a rock shaft 200, the latter at its right hand end having secured to it another arm 92 (Fig. 11) which at its lower end is pivotally connected to a link 93 which is slotted to engage the shaft 600 (Fig. 12) and is formed with a transversely extending arc-shaped slot 94 to receive a roller 78 on the forward end of the slide bar 76. This arc-shaped slot provides for the up and down swing of the type carrier 70. It will be obvious that through the above-described connections the slide bar will be shifted whenever the lever 10 is shifted.

The plate 80 constitutes an indexing device for variously positioning the special type carrier, said plate having a segmental formation with a series of steps 82, 83, in its rear edge alternating with each other. A bar 84 is pivotally connected to an upper part of the plate 80 and extends forward and is pivotally connected at its front end to an arm 85 swung from a shaft 200^c. On this bar there project laterally a series of roller studs 86, 87, 88, 89. On the rock shaft 204 to which the total key lever 227 is secured there is also fastened at the right hand end a depending arm 90' which is adapted to operate against the stud 86. On the shaft 206 to which the sub-total key lever is secured there is also fastened on the right hand end a depending arm 91' adapted to act against the roller stud 87. The transfer key stem 40 carries a stud 92 (Fig. 1) which works in a slot 93 of an arm 94

secured to a rock shaft 200^b carrying on its right hand end a depending arm 95 adapted to act against the stud 88. The elimination key stem 34 has a cam rise 34^c (Fig. 1) which operates against a roller stud 96 on a link 98 which is coupled to an arm 99 secured to a rock shaft 200^a, which on its right hand end carries a depending arm 99' for acting against the stud 89. Said link 98 is suitably guided by a frame stud *n* projecting into a slot of the link and a spring 98^a normally holds the link forward. The various arms 90', 91', 95 and 99' are graded in normal distances from their respective studs, the arm 90' being farthest away and the distances lessening by degrees between the other studs and their arms. Consequently the said arm 90' moves the indexing plate 80 the least distance and the other arms move said plate increasing distances. With the stop pin slide bar 76 forward as in Fig. 11 the arm 90' moves the plate 80 just far enough to bring the first step or shoulder 82 in line with said stop pin. With the stop pin slide bar moved rearward the same movement of the indexing plate will bring the first step or shoulder 83 in line with the stop pin. Of course it will be understood that when the machine is operated the type carrier is relieved from the restraint of the arm 72 and will move upward until stopped by contact of its pin 75 with the plate 80. The effect therefore of operating the machine to take a total when the stop pin slide bar 76 is forward would be to position the special type carrier with the uppermost type at the printing line. This type has an accumulator identifying mark below the symbol which would indicate that the total was taken from the lower accumulator. Shifting of the lever 10 to take a total from the upper accumulator thrusts the stop pin bar 76 rearward and so in then striking a total the type carrier would move far enough to bring the second type to the printing line. This type has the accumulator identifying mark above the symbol. The sub-total key arm 91' swings the plate 80 a step farther so as to bring either the upper or the lower type of the second type plate to the printing line, according to what position the stop pin bar 76 occupies. Depression of the transfer key causes the arm 95 to act against the stud 88 and move the indexing plate another step and depression of the elimination key causes the arm 99' to act against the stud 89 and move said plate still farther, it being understood of course that the movement of the plate is the extent of two of the steps or shoulders which may be said to comprise two sets, those of one set alternating with those of the other.

It will now be seen that the construction here shown and described is well adapted to fulfil the objects primarily stated, though it is at the same time to be understood that

modifications can be made in such construction within the scope of the invention.

What we claim is:

1. In a machine of the class described, the combination of differentially reciprocatory racks; two sets of accumulating pinions independently engageable with and disengageable from said racks; plural means for engaging and disengaging the racks and pinions, said means severally adjustable to vary the periods of engagement and disengagement between racks and pinions; and means common to said plural means for changing the adjustment of either.

2. In a machine of the class described, the combination of differentially reciprocatory racks; two sets of accumulating pinions independently engageable with and disengageable from said racks; plural means for engaging and disengaging the racks and pinions, said means severally adjustable to vary the periods of engagement and disengagement between racks and pinions; and each means adjustable to disable it from engaging its set of pinions with the racks; and means common to said plural means for changing their adjustment.

3. In a machine of the class described, the combination of differentially reciprocatory racks; two sets of accumulating pinions independently engageable with and disengageable from said racks; plural means for engaging and disengaging the racks and pinions, said means severally adjustable to vary the periods of engagement and disengagement between racks and pinions and each means adjustable to disable it from engaging its set of pinions with the racks and one normally so disabled; and means for enabling that one to engage its pinions with the racks and disabling the other from engaging its pinions with the racks.

4. In a machine of the class described, the combination of differentially reciprocatory racks; two sets of accumulating pinions independently engageable with and disengageable from said racks; plural means for engaging and disengaging the racks and pinions, said means severally adjustable to vary the periods of engagement and disengagement between racks and pinions and each means adjustable to disable it from engaging its set of pinions with the racks and one normally so disabled; means for enabling that one to engage its pinions with the racks and disabling the other from engaging its pinions with the racks; and means common to the said plural means for changing the adjustment of either of the latter to vary the periods of engagement and disengagement of its pinions and the racks.

5. In a machine of the class described, the combination of differentially reciprocatory racks, two sets of accumulating pinions independently engageable with and disen-

gageable from said racks; plural means for engaging and disengaging the racks and pinions, said means severally adjustable to vary the periods of engagement and disengagement between racks and pinions and each means adjustable to disable it from engaging its set of pinions with the racks and one normally so disabled; means for enabling that one to engage its pinions with the racks and disabling the other from engaging its pinions with the racks; means for disabling the last-mentioned element of means to permit pinion-engaging action of the normally disabled member of the plural means; and means common to the said plural means for changing the adjustment of either of the latter to vary the periods of engagement and disengagement of its pinions and the racks.

6. In a machine of the class described, the combination of differentially reciprocatory racks; two sets of accumulating pinions independently engageable with and disengageable from said racks; plural means for engaging and disengaging the racks and pinions, said means severally adjustable to vary the periods of engagement and disengagement between racks and pinions and each means adjustable to disable it from engaging its set of pinions with the racks and one normally so disabled; means for enabling that one to engage its pinions with the racks and disabling the other from engaging its pinions with the racks; and means controlled by said enabling means and common to the said plural means for changing the adjustment of either of the latter to vary the periods of engagement and disengagement of its pinions and the racks.

7. In a machine of the class described, the combination of differentially reciprocatory racks; two sets of accumulating pinions independently engageable with and disengageable from said racks, one set of pinions being normally engaged with the racks; means for disengaging said set of pinions prior to advance of the racks and reengaging them for the return movement of the racks; similar means applied to the other set of pinions which are normally disengaged from the racks; and a controlling device normally disabling said latter means from engaging its pinions with the racks but adjustable to permit said means to perform such function, said device by such adjustment disabling the first-mentioned means from reengaging its pinions with the racks.

8. In a machine of the class described, the combination of differentially reciprocatory racks; two sets of accumulating pinions independently engageable with and disengageable from said racks, one set of pinions being normally engaged with the racks; means for disengaging said set of pinions prior to advance of the racks and reengaging them for the return movement of the racks; similar

means applied to the other set of pinions which are normally disengaged from the racks; a controlling device normally disabling said latter means from engaging its pinions with the racks but adjustable to permit said means to perform such function, said device by such adjustment disabling the first-mentioned means from reengaging its pinions with the racks; and means for adjusting either of the before-mentioned means to vary the order of engagement and disengagement between racks and pinions.

9. In a machine of the class described, the combination of differentially reciprocatory racks; two sets of accumulating pinions independently engageable with and disengageable from said racks, one set of pinions being normally engaged with the racks; means for disengaging said set of pinions prior to advance of the racks and reengaging them for the return movement of the racks; similar means applied to the other set of pinions which are normally disengaged from the racks; a controlling device normally disabling said latter means from engaging its pinions with the racks but adjustable to permit said means to perform such function, said device by such adjustment disabling the first-mentioned means from reengaging its pinions with the racks; and means controlled by said device for adjusting either of the before-mentioned means to vary the order of engagement and disengagement between racks and pinions.

10. In a machine of the class described, the combination of differentially reciprocatory racks; two sets of accumulating pinions independently engageable with and disengageable from said racks, one set of pinions being normally engaged with the racks; means for disengaging said set of pinions prior to advance of the racks and reengaging them for the return movement of the racks; similar means applied to the other set of pinions which are normally disengaged from the racks; a controlling device normally disabling said latter means from engaging its pinions with the racks but adjustable to permit said means to perform such function, said device by such adjustment disabling the first-mentioned means from reengaging its pinions with the racks; means for adjusting either of the before-mentioned means to vary the order of engagement and disengagement between racks and pinions; and means for disabling said controlling device to permit reengagement of either set of pinions for receiving the accumulation of the other set.

11. In a machine of the class described, the combination of differentially reciprocatory racks; two sets of accumulating pinions independently engageable with and disengageable from said racks, one set of pinions being normally engaged with the racks; means for disengaging said set of pinions

prior to advance of the racks and reengaging them for the return movement of the racks; similar means applied to the other set of pinions which are normally disengaged from the racks; a controlling device normally disabling said latter means from engaging its pinions with the racks but adjustable to permit said means to perform such function, said device by such adjustment disabling the first-mentioned means from reengaging its pinions with the racks; means controlled by said device for adjusting either of the before-mentioned means to vary the order of engagement and disengagement between racks and pinions; and means for disabling said controlling device to permit reengagement of either set of pinions for receiving the accumulation of the other set.

12. In a machine of the class described, the combination of differentially reciprocatory racks; two sets of accumulating pinions independently engageable with and disengageable from said racks; rocking supports for the sets of pinions respectively; a pitman for each support adapted to engage the same on either side of its pivot; a movable controlling member adapted to hold either pitman in an intermediate position while permitting the other to engage its pinion-support on one side of the latter's pivot; and a second movable controlling member adapted to disengage such other pitman from its pinion-support on the one side of the latter's pivot and engage it therewith on the opposite side of the pivot.

13. In a machine of the class described, the combination of differentially reciprocatory racks; two sets of accumulating pinions independently engageable with and disengageable from said racks; rocking supports for the sets of pinions respectively; a pitman for each support adapted to engage the same on either side of its pivot; a movable controlling member adapted to hold either pitman in an intermediate position while permitting the other to engage its pinion-support on one side of the latter's pivot; and a second movable controlling member connected with the first adapted to disengage such other pitman from its pinion-support on the one side of the latter's pivot and engage it therewith on the opposite side of the pivot.

14. In a machine of the class described, the combination of differentially reciprocatory racks; two sets of accumulating pinions independently engageable with and disengageable from said racks; rocking supports for the sets of pinions respectively; a pitman for each support adapted to engage the same on either side of its pivot; a movable controlling member adapted to hold either pitman in an intermediate position while permitting the other to engage its pinion-support on one side of the latter's pivot;

a second movable controlling member adapted to disengage such other pitman from its pinion-support on the one side of the latter's pivot and engage it therewith on the opposite side of the pivot; and a third controlling member for disabling the first-mentioned controlling member and operating the second controlling member.

15. In a machine of the class described, the combination of differentially reciprocating racks; two sets of accumulating pinions independently engageable with and disengageable from said racks; rocking supports for the sets of pinions respectively; a pitman for each support adapted to engage the same on either side of its pivot; a movable controlling member adapted to hold either pitman in an intermediate position while permitting the other to engage its pinion-support on one side of the latter's pivot; a second movable controlling member connected with the first adapted to disengage such other pitman from its pinion-support on the one side of the latter's pivot and engage it therewith on the opposite side of the pivot; and a third controlling member for disabling the first-mentioned controlling member and operating the second controlling member.

16. In a machine of the class described, the combination of differentially reciprocating racks and type carriers; two sets of adding pinions independently movable into and out of engagement with said racks; one such set of pinions normally engaged with and the other normally disengaged from the racks, means for holding both sets disengaged during advance of the racks and returning either to engagement for the return movement of the racks; and means for holding either set in engagement with the racks during advance of the same, with provisions for initially engaging a normally disengaged set while disengaging a normally engaged set.

17. In a machine of the class described, the combination of differentially reciprocating racks and type carriers; two sets of adding pinions independently movable into and out of engagement with said racks; one such set of pinions normally engaged with and the other normally disengaged from the racks, means for holding both sets disengaged during advance of the racks and returning either to engagement for the return movement of the racks; and means for holding either set in engagement with the racks during advance and return of the same, with provisions for initially engaging a normally disengaged set while disengaging a normally engaged set.

18. In a machine of the class described, the combination of differentially reciprocating racks and type carriers; two sets of adding pinions independently movable into and out of engagement with said racks; one such set of pinions normally engaged with and the

other normally disengaged from the racks, means for holding both sets disengaged during advance of the racks and returning either to engagement for the return movement of the racks; and means for holding either set in engagement with the racks during advance of the same, with provisions for initially engaging a normally disengaged set while disengaging a normally engaged set and for re-engaging the latter set for the return movement of the racks.

19. In a machine of the class described, the combination of differentially reciprocating racks; two sets of accumulating pinions independently engageable with and disengageable from said racks; rocking supports for the sets of pinions respectively; a pitman for each support adapted to engage the same on either side of its pivot for moving it in both directions; a movable controlling member adapted to hold either pitman in an intermediate position while permitting the other to engage its pinion-support on one side of the latter's pivot to initially disengage its pinions from the racks and reengage them for the return movement of said racks; and a second controlling member adapted to disengage such other pitman from its pinion-support on the one side of the latter's pivot to prevent disengagement of the pinions from the racks, with provisions for effecting engagement of the pitman with the support on the opposite side of the latter's pivot to disengage the pinions for the return movement of the racks, the said second controlling member when positioned to act upon the normally intermediately positioned pitman operating to engage the latter with its pinion-support to move the pinions into engagement with racks.

20. In a machine of the class described, the combination of differentially reciprocating racks; two sets of accumulating pinions independently engageable with and disengageable from said racks; rocking supports for the sets of pinions respectively; a pitman for each support adapted to engage the same on either side of its pivot for moving it in both directions; a movable controlling member adapted to hold either pitman in an intermediate position while permitting the other to engage its pinion-support on one side of the latter's pivot to initially disengage its pinions from the racks and reengage them for the return movement of said racks; and a second controlling member connected with the first adapted to disengage such other pitman from its pinion-support on the one side of the latter's pivot to prevent disengagement of the pinions from the racks, with provisions for effecting engagement of the pitman with the support on the opposite side of the latter's pivot to disengage the pinions for the return movement of the racks; the said second controlling member when positioned

to act upon the normally intermediately positioned pitman operating to engage the latter with its pinion-support to move the pinions into engagement with racks and the corresponding positioning of the first-mentioned controlling member effecting movement of the other pitman to the intermediate position.

21. In a machine of the class described, the combination of differentially reciprocatory racks; two sets of accumulating pinions independently engageable with and disengageable from said racks; rocking supports for the sets of pinions respectively; a pitman for each support adapted to engage the same on either side of its pivot for moving it in both directions; a movable controlling member adapted to hold either pitman in an intermediate position while permitting the other to engage its pinion-support on one side of the latter's pivot to initially disengage its pinions from the racks and reengage them for the return movement of said racks; and a second controlling member adapted to disengage such other pitman from its pinion-support on the one side of the latter's pivot to prevent disengagement of the pinions from the racks, with provisions for effecting engagement of the pitman with the support on the opposite side of the latter's pivot to disengage the pinions for the return movement of the racks, the said second controlling member when positioned to act upon the normally intermediately positioned pitman operating to engage the latter with its pinion-support to move the pinions into engagement with racks, and either pitman when in the intermediate position adapted to initially disengage its pinions from the racks.

22. In a machine of the class described, the combination of differentially reciprocatory racks; two sets of accumulating pinions independently engageable with and disengageable from said racks; rocking supports for the sets of pinions respectively; a pitman for each support adapted to engage the same on either side of its pivot for moving it in both directions; a movable controlling member adapted to hold either pitman in an intermediate position while permitting the other to engage its pinion-support on one side of the latter's pivot to initially disengage its pinions from the racks and reengage them for the return movement of said racks; and a second controlling member connected with the first adapted to disengage such other pitman from its pinion-support on the one side of the latter's pivot to prevent disengagement of the pinions from the racks, with provisions for effecting engagement of the pitman with the support on the opposite side of the latter's pivot to disengage the pinions for the return movement of the racks, the said second controlling member when positioned to act upon the normally intermediately positioned

pitman operating to engage the latter with its pinion-support to move the pinions into engagement with racks and the corresponding positioning of the first-mentioned controlling member effecting movement of the other pitman to the intermediate position, and either pitman when in the intermediate position adapted to initially disengage its pinions from the racks.

23. In a machine of the class described, the combination of differentially reciprocatory racks; two sets of accumulating pinions independently engageable with and disengageable from said racks; rocking supports for the sets of pinions respectively; a pitman for each support adapted to engage the same on either side of its pivot for moving it in both directions; a movable controlling member adapted to hold either pitman in an intermediate position while permitting the other to engage its pinion-support on one side of the latter's pivot to initially disengage its pinions from the racks and reengage them for the return movement of said racks; a second controlling member adapted to disengage such other pitman from its pinion-support on the one side of the latter's pivot to prevent disengagement of the pinions from the racks, with provisions for effecting engagement of the pitman with the support on the opposite side of the latter's pivot to disengage the pinions for the return movement of the racks, the said second controlling member when positioned to act upon the normally intermediately positioned pitman operating to engage the latter with its pinion-support to move the pinions into engagement with racks; and a third controlling member adapted to disable the first-mentioned controlling member and operating the second controlling member to cause the set of pinions disengaged during advance of racks to become engaged for the return movement of the racks.

24. In a machine of the class described, the combination of differentially reciprocatory racks; two sets of accumulating pinions independently engageable with and disengageable from said racks; rocking supports for the sets of pinions respectively; a pitman for each support adapted to engage the same on either side of its pivot for moving it in both directions; a movable controlling member adapted to hold either pitman in an intermediate position while permitting the other to engage its pinion-support on one side of the latter's pivot to initially disengage its pinions from the racks and reengage them for the return movement of said racks; a second controlling member connected with the first adapted to disengage such other pitman from its pinion-support on the one side of the latter's pivot to prevent disengagement of the pinions from the racks, with provisions for effecting engagement of the pitman with the support on the opposite side of the lat-

ter's pivot to disengage the pinions for the return movement of the racks; the said second controlling member when positioned to act upon the normally intermediately positioned pitman operating to engage the latter with its pinion-support to move the pinions into engagement with racks and the corresponding positioning of the first-mentioned controlling member effecting movement of the other pitman to the intermediate position; and a third controlling member adapted to disable the first-mentioned controlling member and operating the second controlling member to cause the set of pinions disengaged during advance of racks to become engaged for the return movement of the racks.

25. In a machine of the class described, the combination of differentially reciprocatory racks; two sets of accumulating pinions independently engageable with and disengageable from said racks; rocking supports for the sets of pinions respectively; a pitman for each support adapted to engage the same on either side of its pivot for moving it in both directions; a movable controlling member adapted to hold either pitman in an intermediate position while permitting the other to engage its pinion-support on one side of the latter's pivot to initially disengage its pinions from the racks and reengage them for the return movement of said racks; a second controlling member adapted to disengage such other pitman from its pinion-support on the one side of the latter's pivot to prevent disengagement of the pinions from the racks, with provisions for effecting engagement of the pitman with the support on the opposite side of the latter's pivot to disengage the pinions for the return movement of the racks, the said second controlling member when positioned to act upon the normally intermediately positioned pitman operating to engage the latter with its pinion-support to move the pinions into engagement with racks, and either pitman when in the intermediate position adapted to initially disengage its pinions from the racks; and a third controlling member adapted to disable the first-mentioned controlling member and operating the second controlling member to cause the set of pinions disengaged during advance of racks to become engaged for the return movement of the racks.

26. In a machine of the class described, the combination of differentially reciprocatory racks; two sets of accumulating pinions independently engageable with and disengageable from said racks; rocking supports for the sets of pinions respectively; a pitman for each support adapted to engage the same on either side of its pivot for moving it in both directions; a movable controlling member adapted to hold either pitman in an intermediate position while permitting the other to

engage its pinion-support on one side of the latter's pivot to initially disengage its pinions from the racks and reengage them for the return movement of said racks; a second controlling member connected with the first adapted to disengage such other pitman from its pinion-support on the one side of the latter's pivot to prevent disengagement of the pinions from the racks, with provisions for effecting engagement of the pitman with the support on the opposite side of the latter's pivot to disengage the pinions for the return movement of the racks, the said second controlling member when positioned to act upon the normally intermediately positioned pitman operating to engage the latter with its pinion-support to move the pinions into engagement with racks and the corresponding positioning of the first-mentioned controlling member effecting movement of the other pitman to the intermediate position, and either pitman when in the intermediate position adapted to initially disengage its pinions from the racks; and a third controlling member adapted to disable the first-mentioned controlling member and operating the second controlling member to cause the set of pinions disengaged during advance of racks to become engaged for the return movement of the racks.

27. In a machine of the class described, the combination of differentially reciprocatory racks; two sets of accumulating pinions independently engageable with and disengageable from said racks; rocking supports for the sets of pinions respectively; a pitman for each support adapted to engage the same on either side of its pivot for moving it in both directions; a movable controlling member adapted to hold either pitman in an intermediate position while permitting the other to engage its pinion-support on one side of the latter's pivot to initially disengage its pinions from the racks and reengage them for the return movement of said racks; a second controlling member adapted to disengage such other pitman from its pinion-support on the one side of the latter's pivot to prevent disengagement of the pinions from the racks, with provisions for effecting engagement of the pitman with the support on the opposite side of the latter's pivot to disengage the pinions for the return movement of the racks, the said second controlling member when positioned to act upon the normally intermediately positioned pitman operating to engage the latter with its pinion-support to move the pinions into engagement with racks; means for reciprocating the pitmen; and a controlling member for operating the said second controlling member and disabling said reciprocating means as to movement of the pitmen in one direction.

28. In a machine of the class described,

the combination of differentially reciprocatory racks; two sets of accumulating pinions independently engageable with and disengageable from said racks; rocking supports for the sets of pinions respectively; a pitman for each support adapted to engage the same on either side of its pivot for moving it in both directions; a movable controlling member adapted to hold either pitman in an intermediate position while permitting the other to engage its pinion-support on one side of the latter's pivot to initially disengage its pinions from the racks and reengage them for the return movement of said racks; a second controlling member connected with the first adapted to disengage such other pitman from its pinion-support on the one side of the latter's pivot to prevent disengagement of the pinions from the racks, with provisions for effecting engagement of the pitman with the support on the opposite side of the latter's pivot to disengage the pinions for the return movement of the racks, the said second controlling member when positioned to act upon the normally intermediately positioned pitman operating to engage the latter with its pinion-support to move the pinions into engagement with racks and the corresponding positioning of the first-mentioned controlling member effecting movement of the other pitman to the intermediate position; means for reciprocating the pitmen; and a controlling member for operating the said second controlling member and disabling said reciprocating means as to movement of the pitmen in one direction.

29. In a machine of the class described, the combination of differentially reciprocatory racks; two sets of accumulating pinions independently engageable with and disengageable from said racks; rocking supports for the sets of pinions respectively; a pitman for each support adapted to engage the same on either side of its pivot for moving it in both directions; a movable controlling member adapted to hold either pitman in an intermediate position while permitting the other to engage its pinion-support on one side of the latter's pivot to initially disengage its pinions from the racks and reengage them for the return movement of said racks; a second controlling member adapted to disengage such other pitman from its pinion-support on the one side of the latter's pivot to prevent disengagement of the pinions from the racks, with provisions for effecting engagement of the pitman with the support on the opposite side of the latter's pivot to disengage the pinions for the return movement of the racks, the said second controlling member when positioned to act upon the normally intermediately positioned pitman operating to engage the latter with its pinion-support to move the pinions into engage-

ment with racks, and either pitman when in the intermediate position adapted to initially disengage its pinions from the racks; means for reciprocating the pitmen; and a controlling member for operating the said second controlling member and disabling said reciprocating means as to movement of the pitmen in one direction.

30. In a machine of the class described, the combination of differentially reciprocatory racks; two sets of accumulating pinions independently engageable with and disengageable from said racks; rocking supports for the sets of pinions respectively; a pitman for each support adapted to engage the same on either side of its pivot for moving it in both directions; a movable controlling member adapted to hold either pitman in an intermediate position while permitting the other to engage its pinion-support on one side of the latter's pivot to initially disengage its pinions from the racks and reengage them for the return movement of said racks; a second controlling member connected with the first adapted to disengage such other pitman from its pinion-support on the one side of the latter's pivot to prevent disengagement of the pinions from the racks, with provisions for effecting engagement of the pitman with the support on the opposite side of the latter's pivot to disengage the pinions for the return movement of the racks, the said second controlling member when positioned to act upon the normally intermediately positioned pitman operating to engage the latter with its pinion-support to move the pinions into engagement with racks and the corresponding positioning of the first-mentioned controlling member effecting movement of the other pitman to the intermediate position, and either pitman when in the intermediate position adapted to initially disengage its pinions from the racks; means for reciprocating the pitmen; and a controlling member for operating the said second controlling member and disabling said reciprocating means as to movement of the pitmen in one direction.

31. In a machine of the class described, the combination of differentially reciprocatory racks; two sets of accumulating pinions independently engageable with and disengageable from said racks; rocking supports for the sets of pinions respectively; a pitman for each support adapted to engage the same on either side of its pivot for moving it in both directions; a movable controlling member adapted to hold either pitman in an intermediate position while permitting the other to engage its pinion-support on one side of the latter's pivot to initially disengage its pinions from the racks and reengage them for the return movement of said racks; a second controlling member adapted to disengage such other pitman from its pinion-sup-

port on the one side of the latter's pivot to prevent disengagement of the pinions from the racks, with provisions for effecting engagement of the pitman with the support on the opposite side of the latter's pivot to disengage the pinions for the return movement of the racks, the said second controlling member when positioned to act upon the normally intermediately positioned pitman operating to engage the latter with its pinion-support to move the pinions into engagement with racks; a third controlling member adapted to disable the first-mentioned controlling member and operating the second controlling member to cause the set of pinions disengaged during advance of racks to become engaged for the return movement of the racks; means for reciprocating the pitmen; and a controlling member for operating the said second controlling member and disabling said reciprocating means as to movement of the pitmen in one direction.

32. In a machine of the class described, the combination of differentially reciprocatory racks; two sets of accumulating pinions independently engageable with and disengageable from said racks; rocking supports for the sets of pinions respectively; a pitman for each support adapted to engage the same on either side of its pivot for moving it in both directions; a movable controlling member adapted to hold either pitman in an intermediate position while permitting the other to engage its pinion-support on one side of the latter's pivot to initially disengage its pinions from the racks and reengage them for the return movement of said racks; a second controlling member connected with the first adapted to disengage such other pitman from its pinion-support on the one side of the latter's pivot to prevent disengagement of the pinions from the racks, with provisions for effecting engagement of the pitman with the support on the opposite side of the latter's pivot to disengage the pinions for the return movement of the racks, the said second controlling member when positioned to act upon the normally intermediately positioned pitman operating to engage the latter with its pinion-support to move the pinions into engagement with racks and the corresponding positioning of the first-mentioned controlling member effecting movement of the other pitman to the intermediate position; a third controlling member adapted to disable the first-mentioned controlling member and operating the second controlling member to cause the set of pinions disengaged during advance of racks to become engaged for the return movement of the racks; means for reciprocating the pitmen; and a controlling member for operating the said second controlling member and disabling said reciprocating means as to movement of the pitmen in one direction.

33. In a machine of the class described, the combination of differentially reciprocatory racks; two sets of accumulating pinions independently engageable with and disengageable from said racks; rocking supports for the sets of pinions respectively; a pitman for each support adapted to engage the same on either side of its pivot for moving it in both directions; a movable controlling member adapted to hold either pitman in an intermediate position while permitting the other to engage its pinion-support on one side of the latter's pivot to initially disengage its pinions from the racks and reengage them for the return movement of said racks; a second controlling member adapted to disengage such other pitman from its pinion-support on the one side of the latter's pivot to prevent disengagement of the pinions from the racks, with provisions for effecting engagement of the pitman with the support on the opposite side of the latter's pivot to disengage the pinions for the return movement of the racks, the said second controlling member when positioned to act upon the normally intermediately positioned pitman operating to engage the latter with its pinion-support to move the pinions into engagement with the racks, and either pitman when in the intermediate position adapted to initially disengage its pinions from the racks; a third controlling member adapted to disable the first-mentioned controlling member and operating the second controlling member to cause the set of pinions disengaged during advance of racks to become engaged for the return movement of the racks; means for reciprocating the pitmen; and a controlling member for operating the said second controlling member and disabling said reciprocating means as to movement of the pitmen in one direction.

34. In a machine of the class described, the combination of differentially reciprocatory racks; two sets of accumulating pinions independently engageable with and disengageable from said racks; rocking supports for the sets of pinions respectively; a pitman for each support adapted to engage the same on either side of its pivot for moving it in both directions; a movable controlling member adapted to hold either pitman in an intermediate position while permitting the other to engage its pinion-support on one side of the latter's pivot to initially disengage its pinions from the racks and reengage them for the return movement of said racks; a second controlling member connected with the first adapted to disengage such other pitman from its pinion-support on the one side of the latter's pivot to prevent disengagement of the pinions from the racks, with provisions for effecting engagement of the pitman with the support on the opposite side of the latter's pivot to disengage the pinions for

the return movement of the racks, the said second controlling member when positioned to act upon the normally intermediately positioned pitman operating to engage the latter with its pinion-support to move the pinions into engagement with racks and the corresponding positioning of the first-mentioned controlling member effecting movement of the other pitman to the intermediate position, and either pitman when in the intermediate position adapted to initially disengage its pinions from the racks; a third controlling member adapted to disable the first-mentioned controlling member and operating the second controlling member to cause the set of pinions disengaged during advance of racks to become engaged for the return movement of the racks; means for reciprocating the pitmen; and a controlling member for operating the said second controlling member and disabling said reciprocating means as to movement of the pitmen in one direction.

35. In a machine of the class described, the combination of differentially reciprocating racks; two sets of accumulating pinions independently engageable with and disengageable from said racks; rocking supports for the sets of pinions respectively; a pitman for each support adapted to engage the same on either side of its pivot for moving it in both directions; a movable controlling member adapted to hold either pitman in an intermediate position while permitting the other to engage its pinion-support on one side of the latter's pivot to initially disengage its pinions from the racks and re-engage them for the return movement of said racks; a second controlling member adapted to disengage such other pitman from its pinion-support on the one side of the latter's pivot to prevent disengagement of the pinions from the racks, with provisions for effecting engagement of the pitman with the support on the opposite side of the latter's pivot to disengage the pinions for the return movement of the racks; the said second controlling member when positioned to act upon the normally intermediately positioned pitman operating to engage the latter with its pinion-support to move the pinions into engagement with racks; means for reciprocating the pitmen; a controlling member for operating the said second controlling member and disabling said reciprocating means as to movement of the pitmen in one direction; and a lock for preventing operation of said disabling member when the second controlling member is otherwise operated.

36. In a machine of the class described, the combination of differentially reciprocating racks; two sets of accumulating pinions independently engageable with and disengageable from said racks; rocking supports for the sets of pinions respectively; a pitman

for each support adapted to engage the same on either side of its pivot for moving it in both directions; a movable controlling member adapted to hold either pitman in an intermediate position while permitting the other to engage its pinion-support on one side of the latter's pivot to initially disengage its pinions from the racks and reengage them for the return movement of said racks; a second controlling member adapted to disengage such other pitman from its pinion-support on the one side of the latter's pivot to prevent disengagement of the pinions from the racks, with provisions for effecting engagement of the pitman with the support on the opposite side of the latter's pivot to disengage the pinions for the return movement of the racks, the said second controlling member when positioned to act upon the normally intermediately positioned pitman operating to engage the latter with its pinion-support to move the pinions into engagement with racks; a third controlling member adapted to disable the first-mentioned controlling member and operating the second controlling member to cause the set of pinions disengaged during advance of racks to become engaged for the return movement of the racks; and a lock for preventing operation of said third controlling member when the second controlling member is independently operated.

37. In a machine of the class described, the combination of differentially reciprocating racks; two sets of accumulating pinions independently engageable with and disengageable from said racks; rocking supports for the sets of pinions respectively; a pitman for each support adapted to engage the same on either side of its pivot; a movable controlling member adapted to hold either pitman in an intermediate position while permitting the other to engage its pinion-support on one side of the latter's pivot; a second movable controlling member adapted to disengage such other pitman from its pinion-support on the one side of the latter's pivot and engage it therewith on the opposite side of the pivot; a third controlling member for disabling the first-mentioned controlling member and operating the second controlling member; and a lock for preventing operation of said third controlling member when the second controlling member is independently operated.

38. In a machine of the class described, the combination of differentially reciprocating racks; two sets of adding pinions; rocking frames supporting said sets respectively and each having studs above and below its pivot; a pitman for each frame having branches notched to engage the studs respectively of the associated frame, the upper notch being higher on the rear side than the front; means yieldingly upholding the pit-

men; an adjustable displacing member to engage one or the other pitman and hold it in an intermediate position; and a second pitman-displacing member connected with the first and adapted to disengage either pitman from the upper stud of its pinion frame and engage it with the lower stud.

39. In a machine of the class described, the combination of differentially reciprocatory racks; two sets of adding pinions; rocking frames supporting said sets respectively and each having studs above and below its pivot; a pitman for each frame having branches notched to engage the studs respectively of the associated frame, the upper notch being higher on the rear side than the front; means yieldingly upholding the pitmen; an adjustable displacing member to engage one or the other pitman and hold it in an intermediate position; a second pitman-displacing member connected with the first and adapted to disengage either pitman from the upper stud of its pinion frame and engage it with the lower stud; and a key for disabling the first-mentioned member and operating the second-mentioned member.

40. In a machine of the class described, the combination of differentially reciprocatory racks; two sets of adding pinions; rocking frames supporting said sets respectively and each having studs above and below its pivot; a pitman for each frame having branches notched to engage the studs respectively of the associated frame, the upper notch being higher on the rear side than the front; means yieldingly upholding the pitmen; and a lever for moving either pitman to an intermediate position.

41. In a machine of the class described, the combination of differentially reciprocatory racks; two sets of adding pinions; rocking frames supporting said sets respectively and each having studs above and below its pivot; a pitman for each frame having branches notched to engage the studs respectively of the associated frame, the upper notch being higher on the rear side than the front; means yieldingly upholding the pitmen; a lever for moving either pitman to an intermediate position; and a pitman-displacing member connected with said lever and adapted to disengage either pitman from the upper stud of its pinion frame and engage it with the lower stud.

42. In a machine of the class described, the combination of differentially reciprocatory racks; two sets of adding pinions; rocking frames supporting said sets respectively and each having studs above and below its pivot; a pitman for each frame having branches notched to engage the studs respectively of the associated frame, the upper notch being higher on the rear side than the front; means yieldingly upholding the pitmen; a lever for moving either pitman to an

intermediate position; a pitman-displacing member connected with said lever and adapted to disengage either pitman from the upper stud of its pinion frame and engage it with the lower stud; and a key for disabling the lever and operating said displacing member.

43. In a machine of the class described, the combination of differentially reciprocatory racks; two sets of adding pinions; rocking frames supporting said sets respectively and each having studs above and below its pivot; a pitman for each frame having branches notched to engage the studs respectively of the associated frame, the upper notch being higher on the rear side than the front; means yieldingly upholding the pitmen; a lever for moving either pitman to an intermediate position; and a thrust bar connected with said lever and adapted to disengage either pitman from the upper stud of its pinion frame and engage it with the lower stud.

44. In a machine of the class described, the combination of differentially reciprocatory racks; two sets of adding pinions; rocking frames supporting said sets respectively and each having studs above and below its pivot; a pitman for each frame having branches notched to engage the studs respectively of the associated frame, the upper notch being higher on the rear side than the front; means yieldingly upholding the pitmen; a lever for moving either pitman to an intermediate position; a thrust bar connected with said lever and adapted to disengage either pitman from the upper stud of its pinion frame and engage it with the lower stud; and a key for operating said thrust bar.

45. In a machine of the class described, the combination of differentially reciprocatory racks; two sets of adding pinions; rocking frames supporting said sets respectively and each having studs above and below its pivot; a pitman for each frame having branches notched to engage the studs respectively of the associated frame, the upper notch being higher on the rear side than the front; means yieldingly upholding the pitmen; a lever for moving either pitman to an intermediate position, said lever having a sliding spring-head contact-piece for engagement with the pitmen; a pitman-displacing member connected with said lever and adapted to disengage either pitman from the upper stud of its pinion frame and engage it with the lower stud; and means for retracting the said sliding abutment-piece and operating the said pitman-displacing member.

46. In a machine of the class described, the combination of differentially reciprocatory racks; two sets of adding pinions; rocking frames supporting said sets respectively and each having studs above and below its pivot; a pitman for each frame having

branches notched to engage the studs respectively of the associated frame, the upper notch being higher on the rear side than the front; means yieldingly upholding the pitmen; 5 a lever for moving either pitman to an intermediate position, said lever having a sliding spring-held contact-piece for engagement with the pitmen; a thrust bar having a slot-and-pin connection with said lever and 10 adapted to disengage either pitman from the upper stud of its pinion frame and engage it with the lower stud; a key-lever connected to said thrust bar; and a second key-lever adapted to operate said first key-lever and 15 retract the sliding contact-piece.

47. In a machine of the class described, the combination of differentially reciprocatory racks; two sets of adding pinions; rocking frames supporting said sets respectively 20 and each having studs above and below its pivot; a pitman for each frame having branches notched to engage the studs respectively of the associated frame, the upper notch being higher on the rear side than the 25 front; means yieldingly upholding the pitmen; a lever for moving either pitman to an intermediate position, said lever having a sliding spring-held contact-piece for engagement with the pitmen; a thrust bar having a slot-and-pin connection with said lever and 30 adapted to disengage either pitman from the upper stud of its pinion frame and engage it with the lower stud; a key-lever connected to said thrust bar; a second key-lever adapted to operate said first key-lever and retract the sliding contact-piece; and a locking 35 piece operated by the first key-lever to obstruct the second key-lever when the first key-lever is operated independently of the 40 second key-lever.

48. In a machine of the class described, the combination of differentially reciprocatory racks; two sets of adding pinions; rocking frames supporting said sets respectively 45 and each having studs above and below its pivot; a pitman for each frame having branches notched to engage the studs respectively of the associated frame, the upper notch being higher on the rear side than the 50 front; means yieldingly upholding the pitmen; a lever for moving either pitman to an intermediate position; and means for locking said lever in different adjusted positions during reciprocation of the pitmen.

55 49. In a machine of the class described, the combination of differentially reciprocatory racks; two sets of adding pinions; rocking frames supporting said sets respectively and each having studs above and below its 60 pivot; a pitman for each frame having branches notched to engage the studs respectively of the associated frame, the upper notch being higher on the rear side than the front; means yieldingly upholding the pitmen; 65 a lever for moving either pitman to an inter-

mediate position; means for reciprocating the pitman including a rocking arm; and a bar attached to said lever and having a lock block to cooperate with said arm.

50. In a machine of the class described, 70 the combination of differentially reciprocatory racks and rack carriers with provisions for excess movement of racks; two sets of adding pinions with transfer projections; independently movable supports for said sets 75 of pinions respectively, means for controlling said supports to move either set of pinions into and out of engagement with the racks; and transfer pawls normally preventing excess movement of racks and having two sets 80 of projections for cooperation with the transfer projections of the two sets of pinions respectively.

51. In a machine of the class described, the combination of differentially reciprocatory racks and rack carriers with provisions 85 for excess movement of racks; two sets of adding pinions arranged in tandem and the pinions of each set having transfer projections; independently movable supports for 90 said sets of pinions respectively; means for controlling said supports to move either set of pinions into and out of engagement with the racks; and transfer pawls normally preventing excess movement of racks and elongated 95 for co-action with transfer projections of both sets of pinions.

52. In a machine of the class described, the combination with printing and accumulating mechanism including two sets of adding 100 wheels; and means for controlling said mechanism to determine which set of wheels shall be operated upon; of a special type carrier for characterizing different transactions; an indexing member having two sets of stops; 105 and a cooperating stop on the said type carrier under control of the said means for determining which set of wheels shall be operated upon.

53. In a machine of the class described, 110 the combination with printing and accumulating mechanism including two sets of adding wheels; and means for controlling said mechanism to determine which set of wheels 115 shall be operated upon; of a special type carrier for characterizing different transactions; an indexing member having two sets of stops, those of one set alternating with those of the other; and a cooperating stop on the said 120 type carriers under control of the said means for determining which set of wheels shall be operated upon.

54. In a machine of the class described, the combination with printing and accumulating mechanism including two sets of adding 125 wheels; and means for controlling said mechanism to determine which set of wheels shall be operated upon; of a special type carrier for characterizing different transactions; an indexing member having two sets of stops, 130

those of one set alternating with those of the other; an adjustable cooperating stop on the type carrier; and means for positioning said stop by the aforesaid means for determining
5 which set of wheels shall be operated upon.

55. In a machine of the class described, the combination with printing and accumulating mechanism including two sets of adding wheels; and means for controlling said
10 mechanism to determine which set of wheels shall be operated upon; of a special type carrier for characterizing different transactions; an indexing member having two sets of stops, those of one set alternating with those of the
15 other; an adjustable cooperating stop on the type carrier; and means for positioning said stop by the aforesaid means for determining which set of wheels shall be operated upon, said positioning means comprising a swing-
20 ing arm and a link connecting the same with the stop.

56. In a machine of the class described, the combination with printing and accumulating mechanism including two sets of add-
25 ing wheels; and means for controlling said mechanism to determine which set of wheels shall be operated upon; of a pivoted special type carrier for characterizing different transactions; an indexing member having two sets
30 of stops, those of one set alternating with those of the other; a sliding cooperating stop on the type carrier; and means for positioning said stop by the aforesaid means for determining which set of wheels shall be oper-
35 ated upon, said positioning means comprising a swinging arm and a slide link connected thereto and arc-slotted for engagement with the sliding stop.

57. In a machine of the class described,
40 the combination with differentially reciprocatory racks and type carriers; two sets of

adding pinions movable into and out of engagement with said racks; means for pre-determining which set of pinions shall pri-
45 marily cooperate with the racks; and key-operated means for variously regulating the periods of engagement and disengagement of racks and pinions; of a special type carrier; an indexing member having two sets of stops; means for positioning said member by
50 the said key-operated means; a stop on the special type carrier; and means for adjusting said stop by the aforesaid means for pre-determining the primarily active set of pinions.
55

58. In a machine of the class described, the combination with differentially reciprocatory racks and type carriers; two sets of adding pinions movable into and out of en-
60 gagement with said racks; means for pre-determining which set of pinions shall primarily cooperate with the racks; and key-operated means for variously regulating the periods of engagement and disengagement of racks and pinions; of a pivoted spring-drawn
65 special type carrier; means for normally restraining the same; a pivoted stepped index plate; a bar coupled thereto and having a plurality of studs; swinging arms to act differentially on the studs respectively, said
70 arms actuated by the key-operated means before mentioned; a sliding stop-piece on the special type carrier; a slide-link slotted to engage said stop-piece; and a swinging arm coupled to said link and operated by the means
75 for pre-determining the primarily active set of pinions.

JESSE G. VINCENT.
NELSON WHITE.

Witnesses:

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R. E. BENNER.