

No. 885,202.

PATENTED APR. 21, 1908.

W. E. SWALM.

## ADDING AND LISTING MACHINE.

APPLICATION FILED OCT. 24, 1907.

8 SHEETS—SHEET 1.

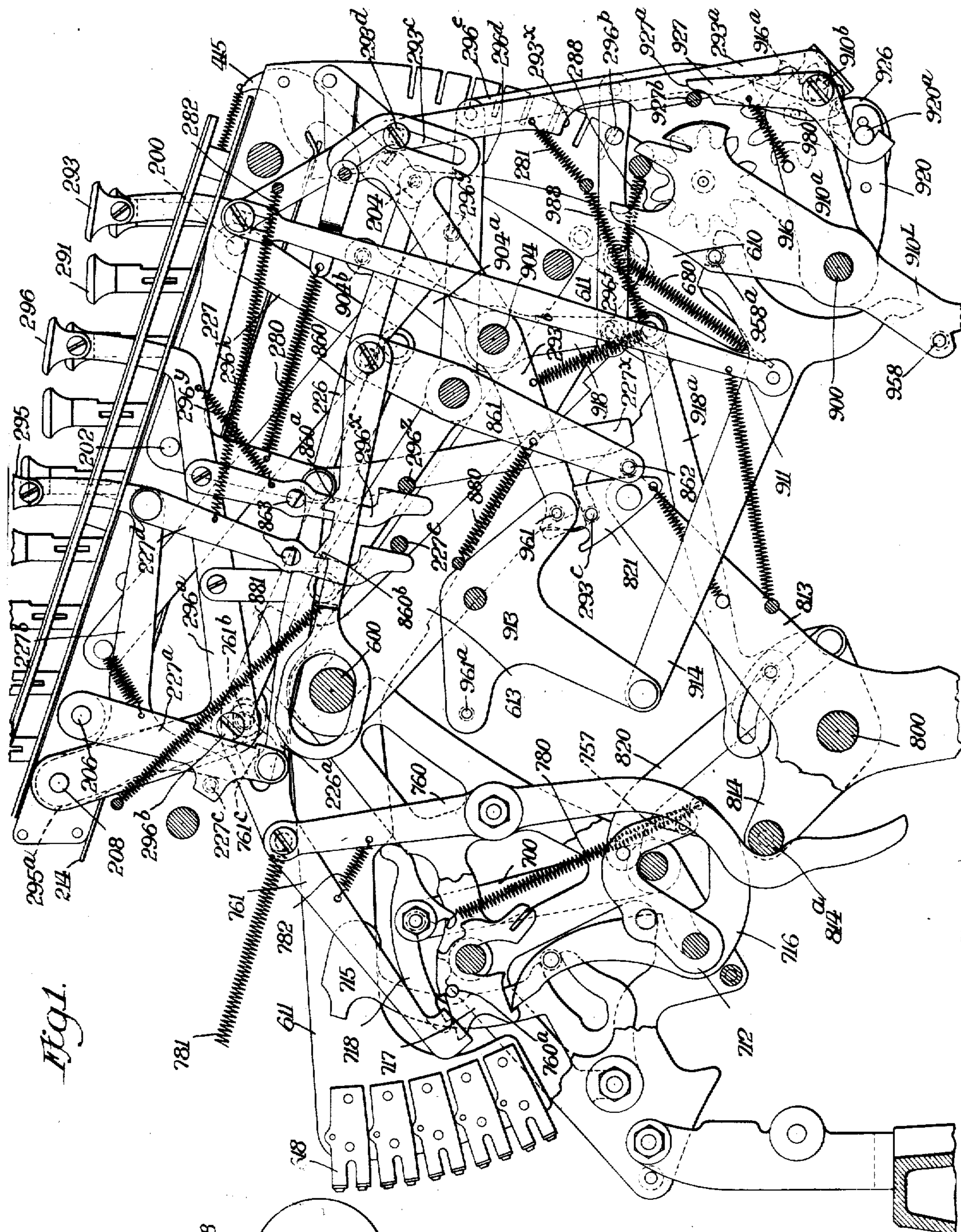


Fig 1.

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**No. 885,202.**

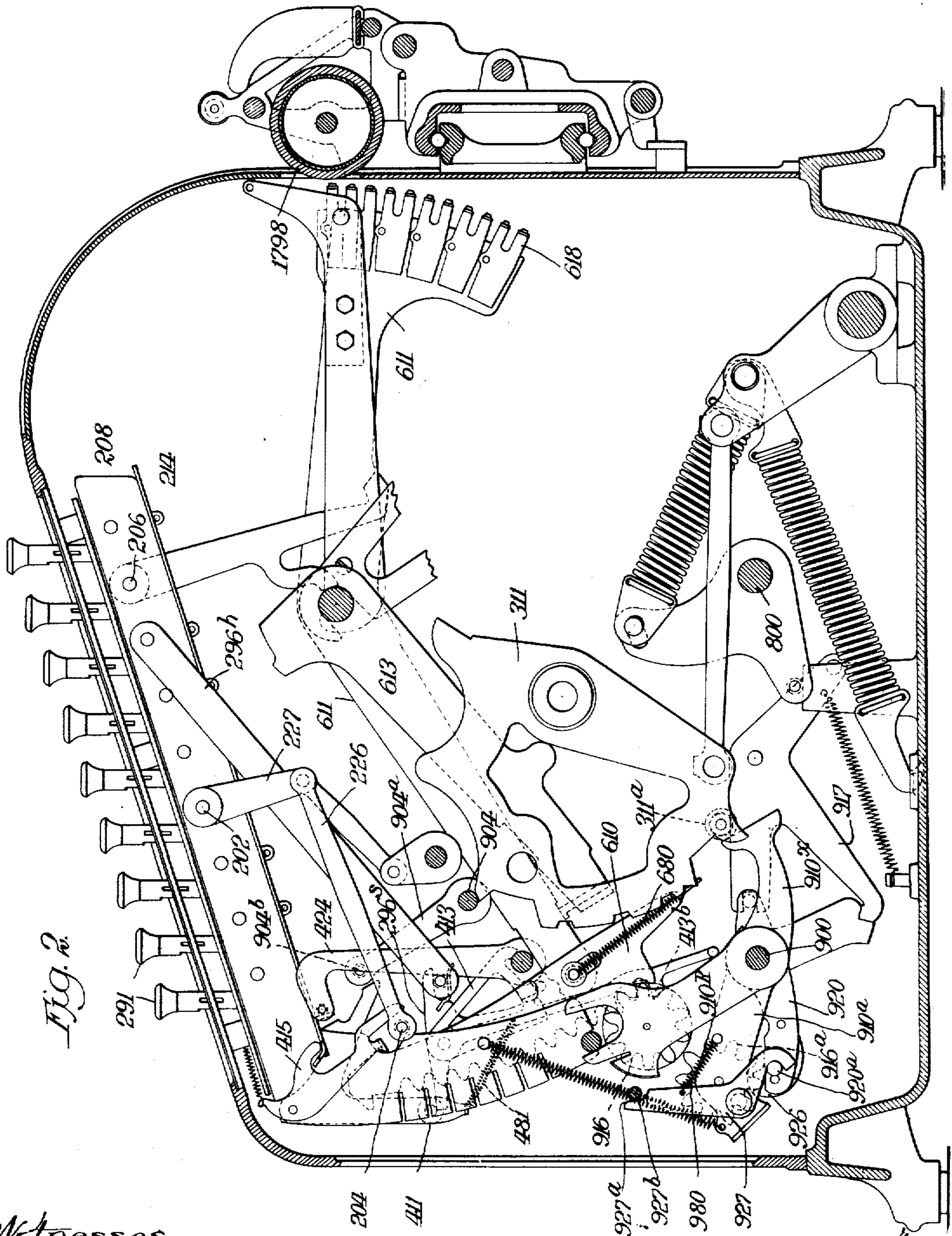
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8 SHEETS—SHEET 2.



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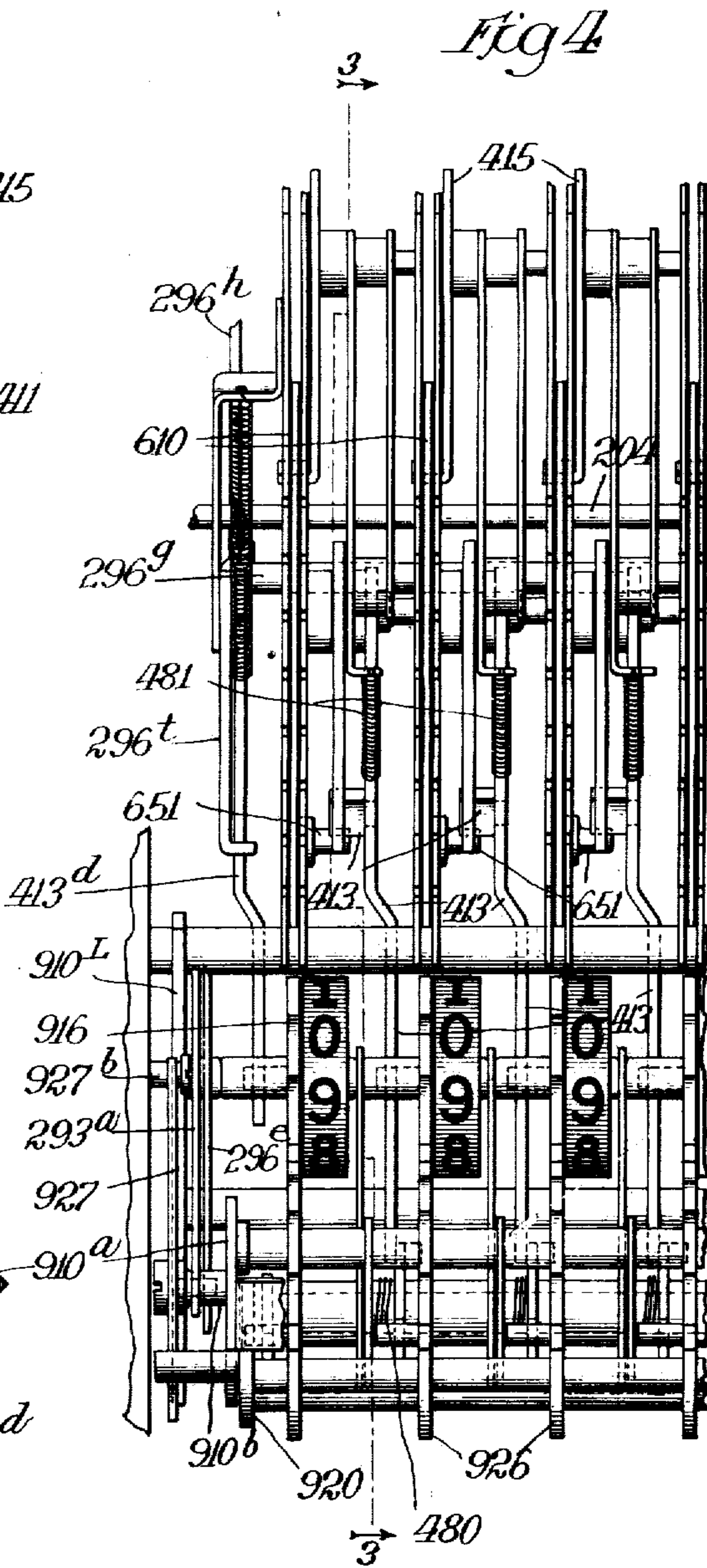
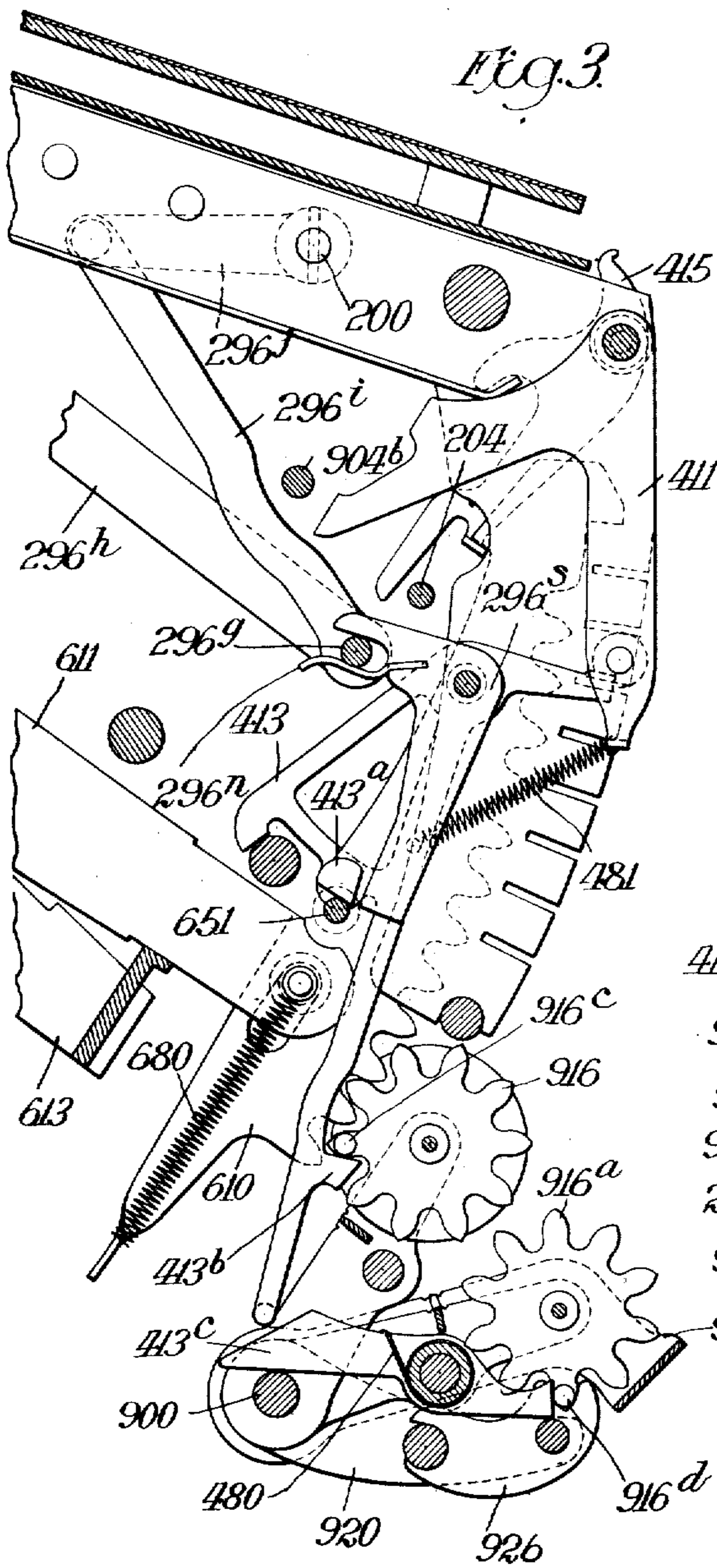
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8 SHEETS—SHEET 3.



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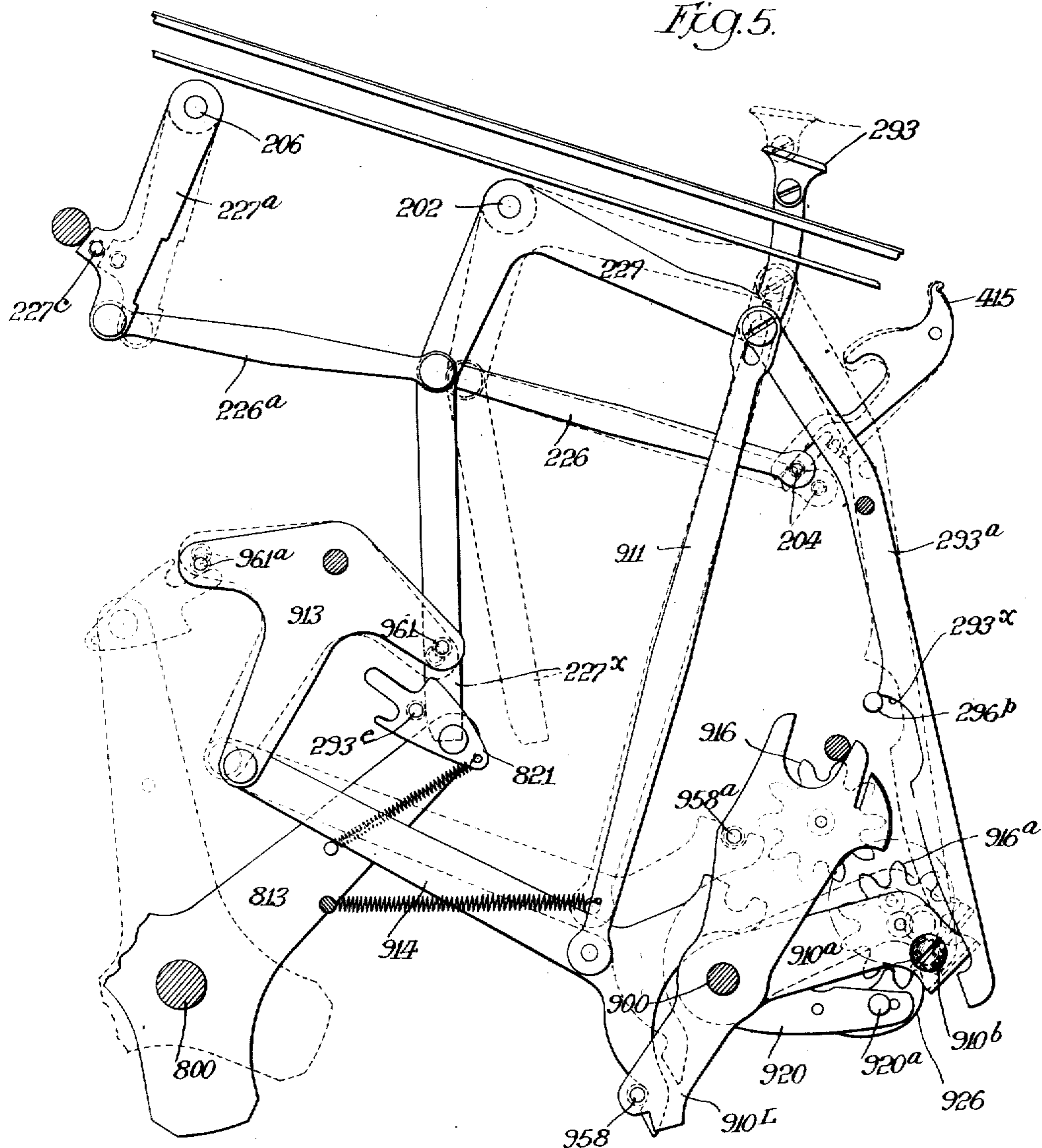
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8 SHEETS—SHEET 4.

Fig. 5.



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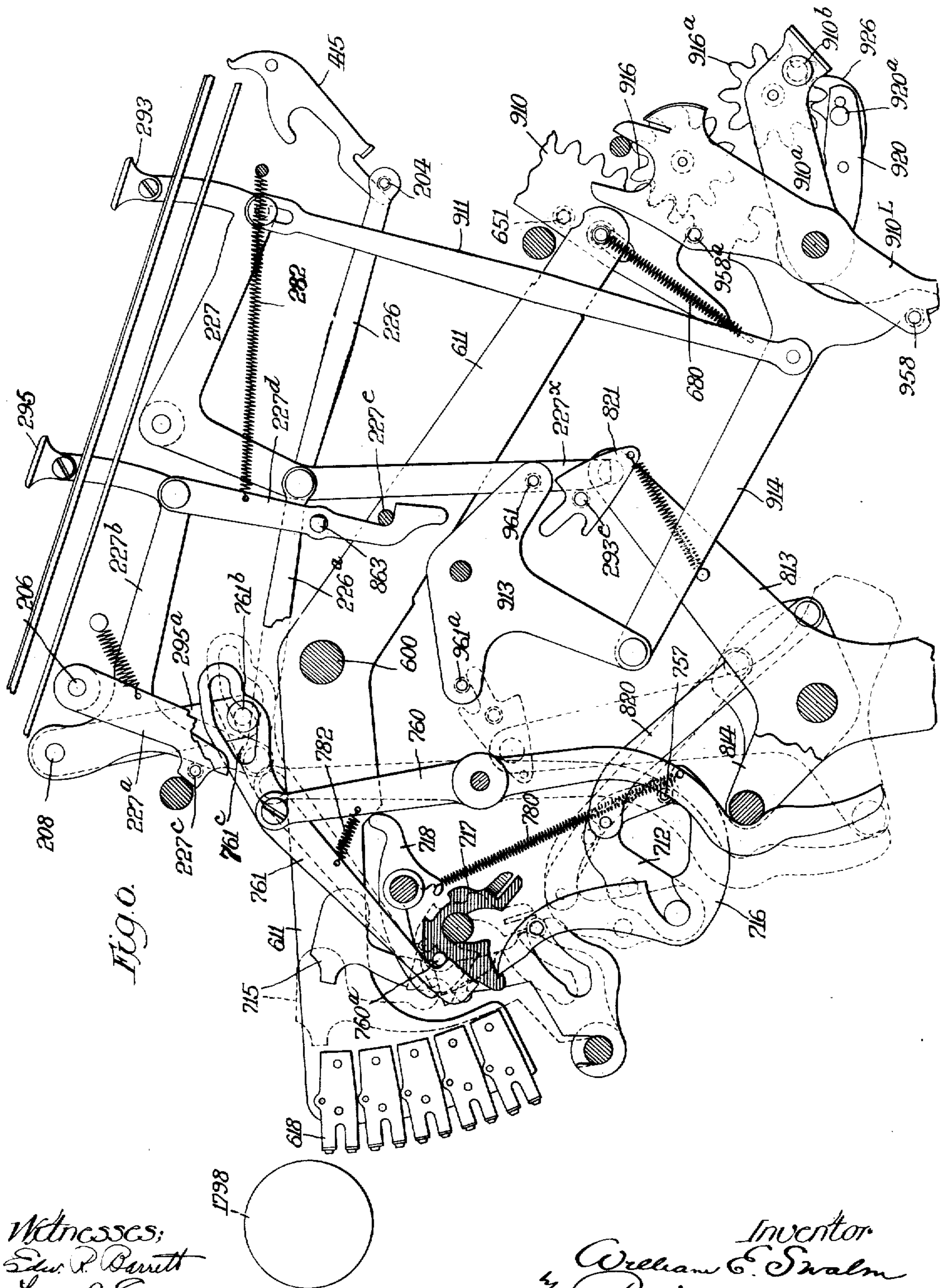
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8 SHEETS—SHEET 5.



Witnesses;  
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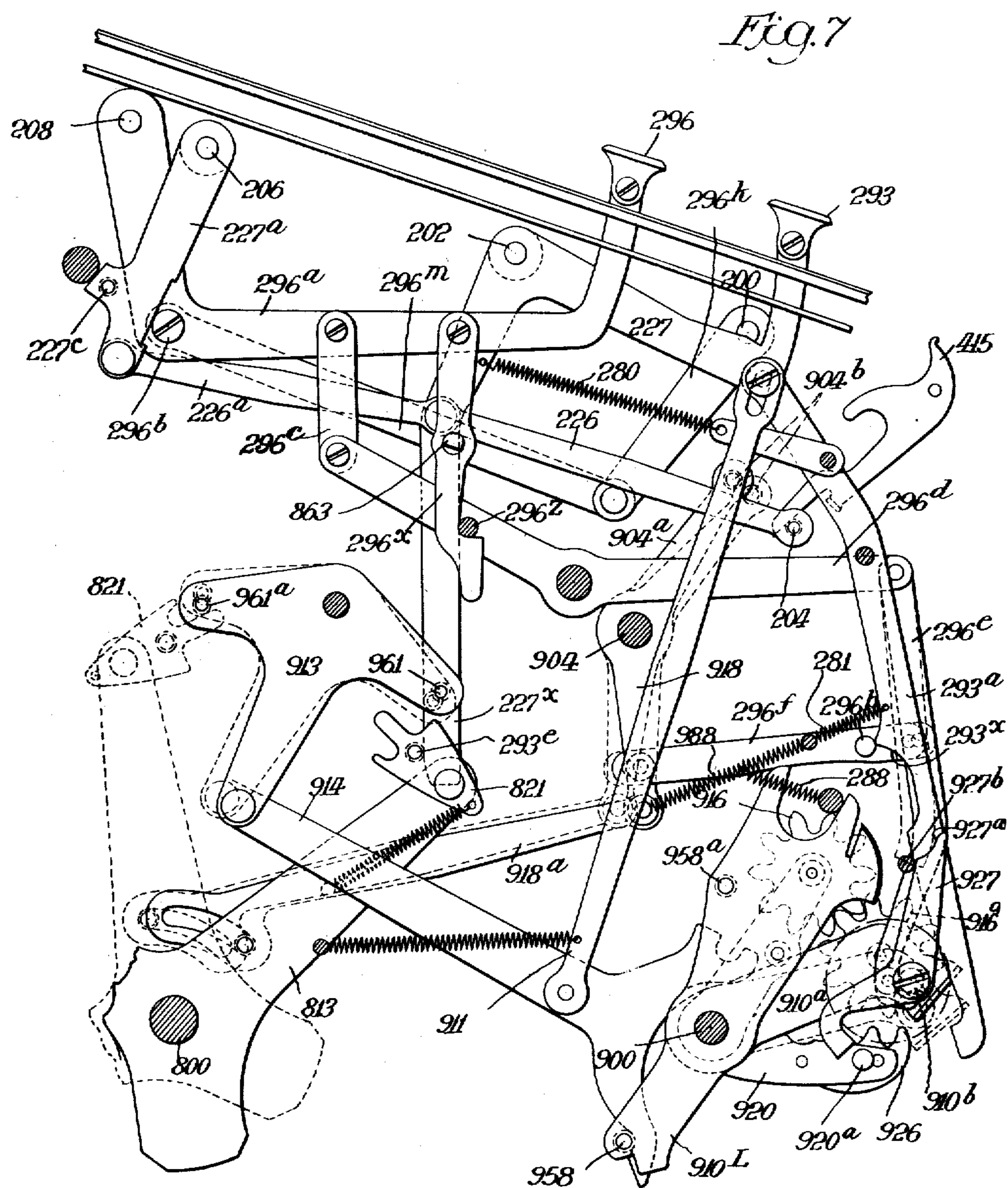
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APPLICATION FILED OCT. 24, 1907.

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8 SHEETS—SHEET 6.



Witnesses  
Edw. P. Bennett  
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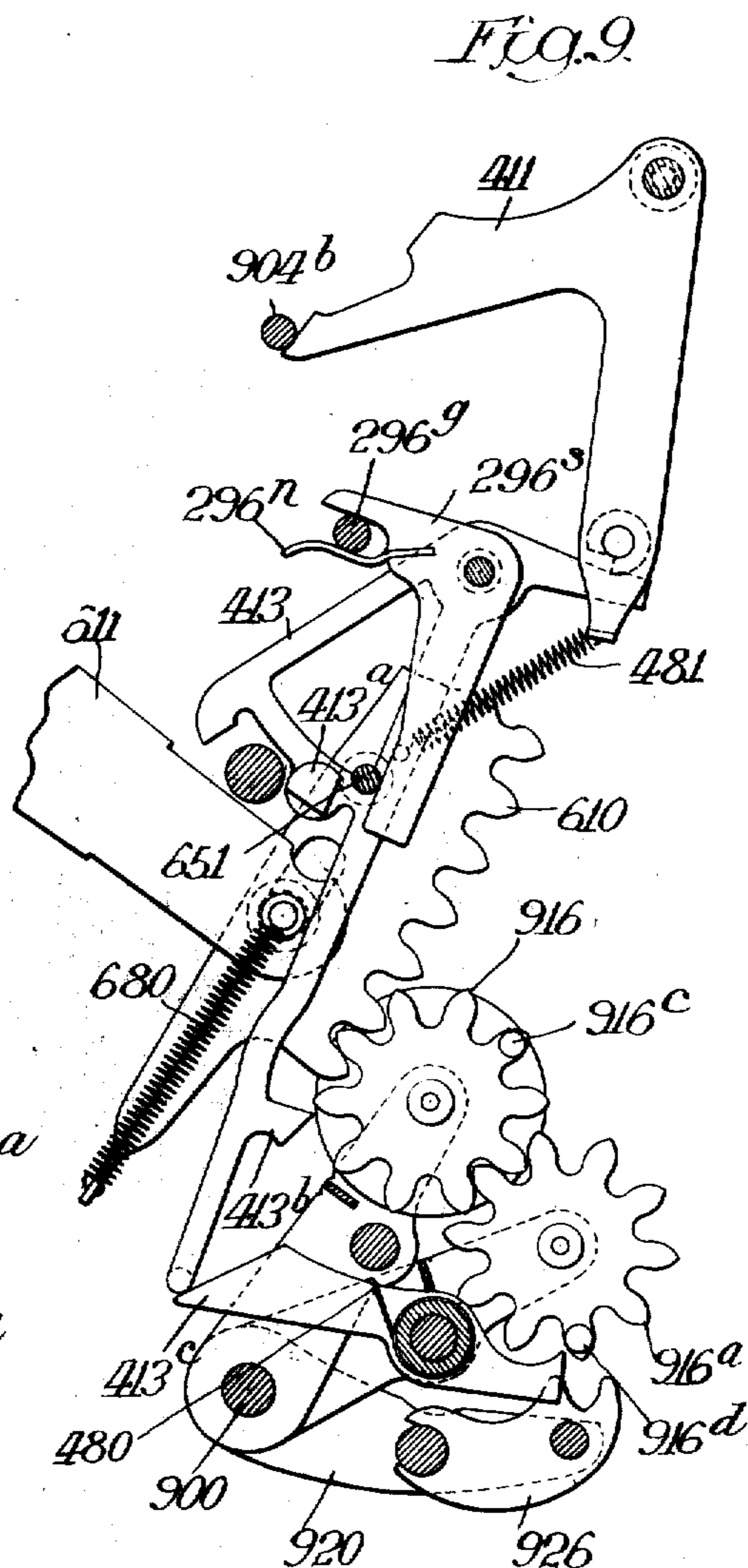
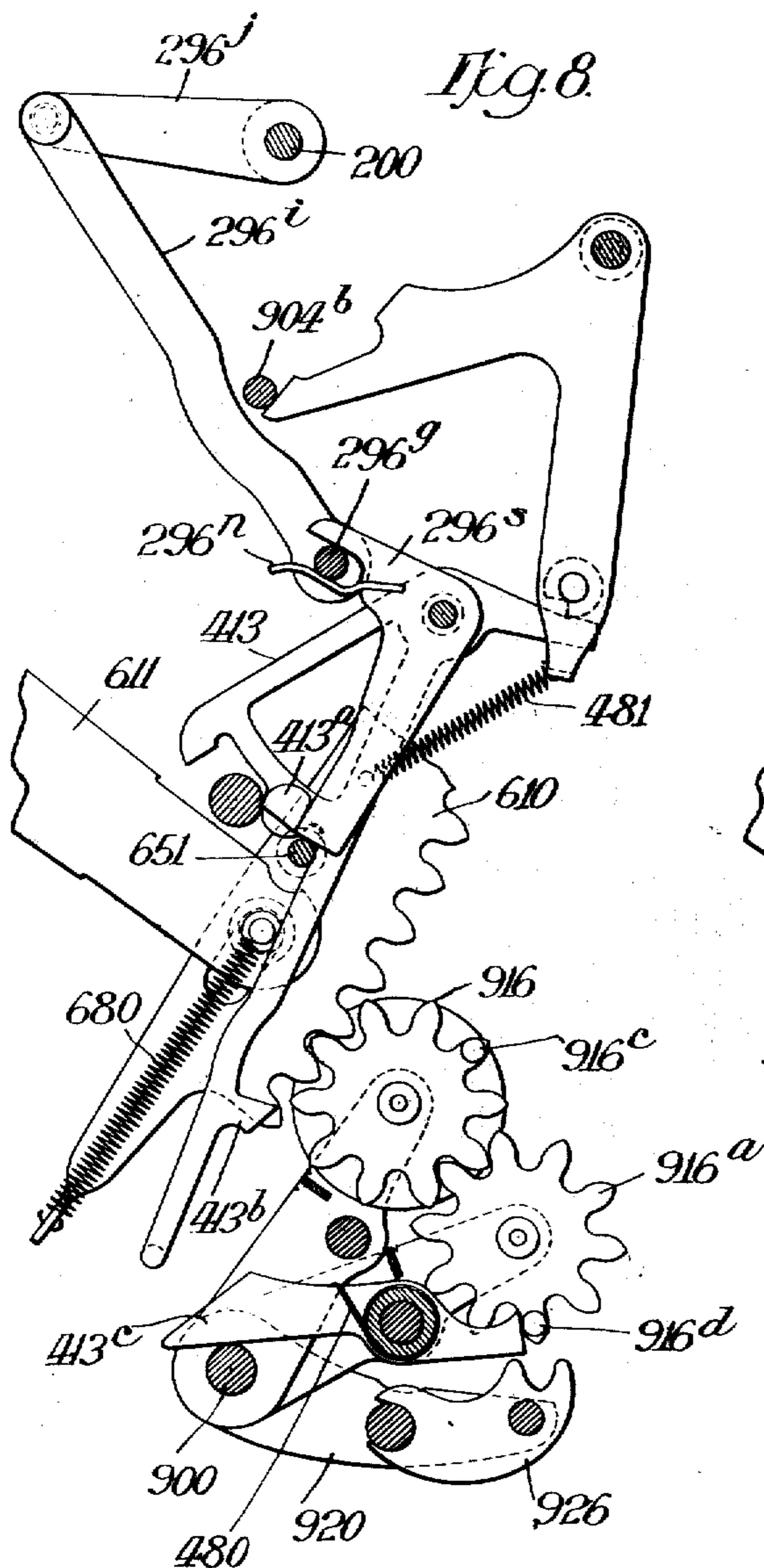
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W. E. SWALM.

ADDING AND LISTING MACHINE.

APPLICATION FILED OCT. 24, 1907.

8 SHEETS—SHEET 7.



Witnesses  
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8 SHEETS—SHEET 3.

Fig 10.

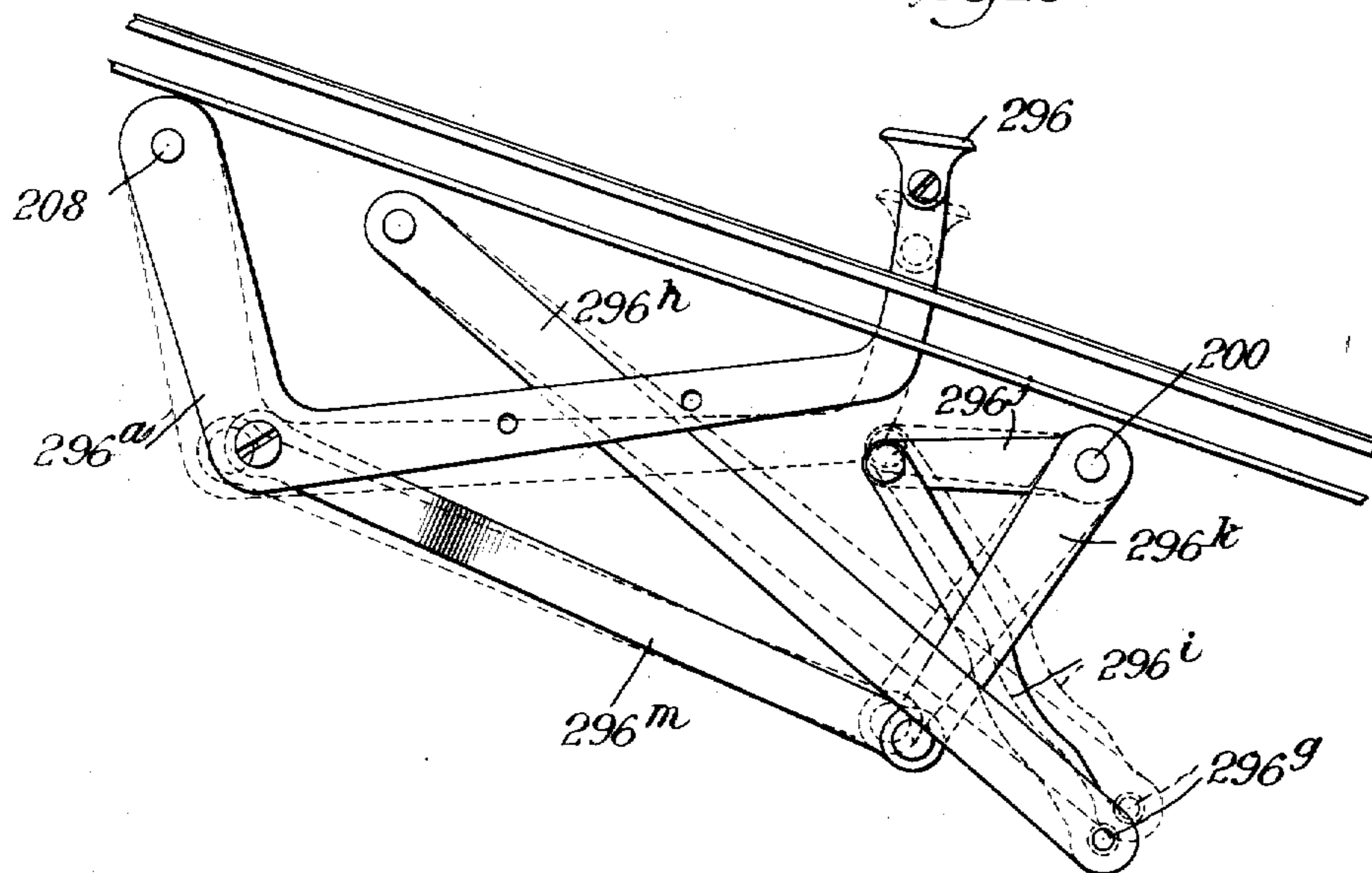
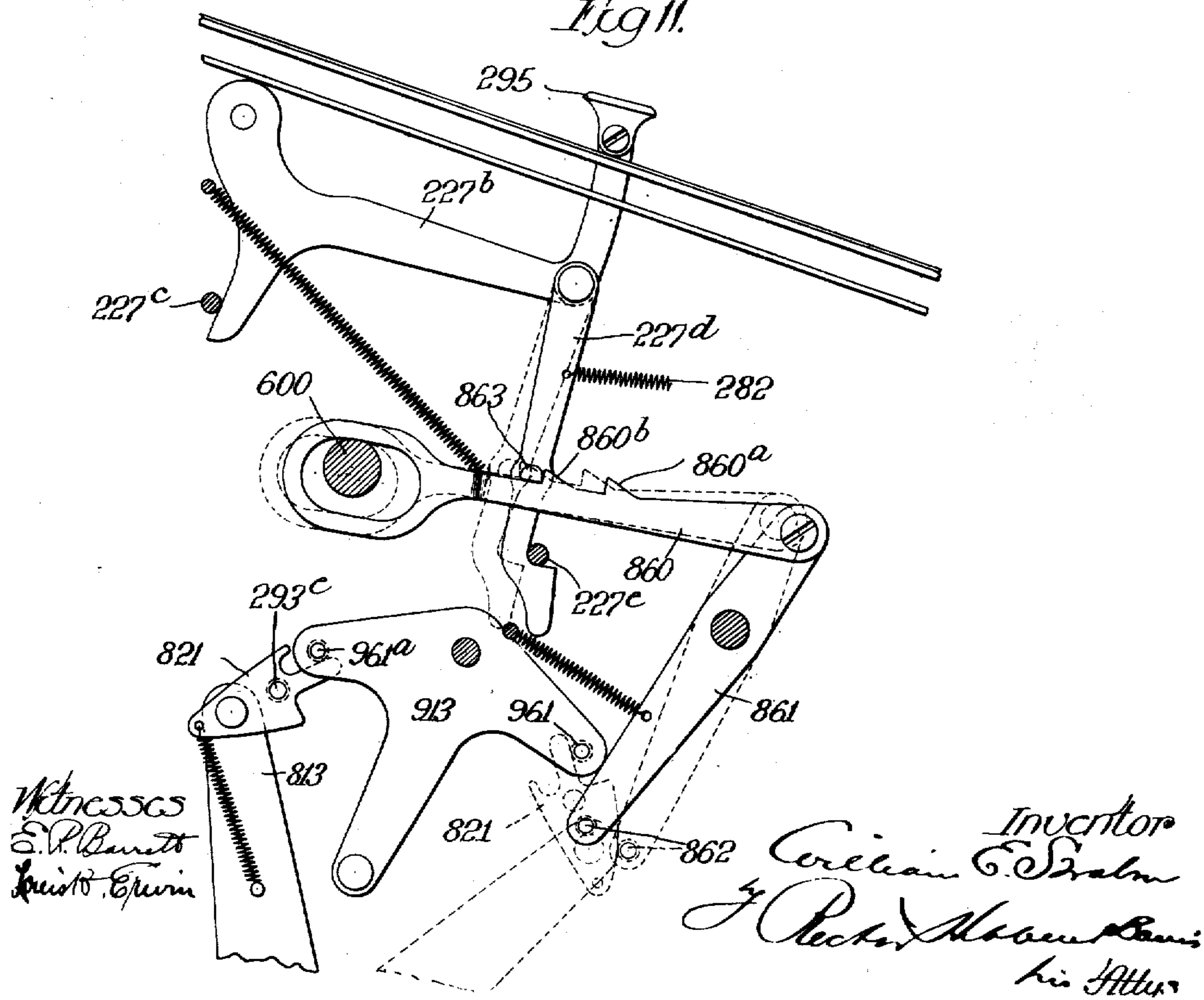


Fig 11.



# UNITED STATES PATENT OFFICE.

WILLIAM E. SWALM, OF LOS ANGELES, CALIFORNIA, ASSIGNOR TO BURROUGHS ADDING MACHINE COMPANY, OF DETROIT, MICHIGAN, A CORPORATION OF MICHIGAN.

## ADDING AND LISTING MACHINE.

No. 885,202.

Specification of Letters Patent.

Patented April 21, 1908.

Application filed October 24, 1907. Serial No. 399,024.

*To all whom it may concern:*

Be it known that I, WILLIAM E. SWALM, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented certain new and useful Improvements in Adding and Listing Machines, of which the following is a description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to what are commonly known as adding machines, and more especially to that type thereof which are capable of not only adding or accumulating, but also of printing or listing, a series of items or amounts, and of printing a total thereof, such as the well-known Burroughs adding and listing machine, constructed under and in substantial accordance with Letters Patent of the United States Nos. 504,963 and 505,078, issued upon the applications of William S. Burroughs on September 12, 1893, and No. 823,474, issued upon the application of Alvan Macauley on June 12, 1906.

The Burroughs machine, constructed under and in accordance with the above-mentioned patents, and other similar machines now upon the market, are capable of and regularly employed for listing and accumulating individual items or amounts in vertical columns, and printing totals or sub-totals thereof when desired. In the taking of totals the accumulating wheels are returned to and left in initial or zero position, thereby "clearing" the machine; while in taking sub-totals the accumulating wheels are left in the positions to which they have been advanced in accumulating the amount of the sub-total, and the latter is included in the next sub-total or total that may be taken, so that if a series of sub-totals be taken in succession, before taking a final or grand total, each sub-total will include the amount of all preceding sub-totals, as will also the final or grand total.

One of the objects of my invention is to equip machines of this class with means whereby a series of successive separate totals may be taken, so that each total will represent merely the sum of the particular series of items of which it constitutes a footing, and by means of which at the end of opera-

tions a grand total of all of the items, or of all of the separate totals, may be taken.

Another purpose of my invention is to provide means in machines of this class whereby cross accumulating work may be done, and the sum of a series of items in a horizontal line be printed at the right hand end of the line, and the aggregate sum or total of such line-totals be printed at the foot of the column of line-totals at the end of operations.

I have illustrated my invention as embodied in the well-known Burroughs machine, and I have provided novel and efficient mechanism for equipping such a machine for the various sorts of work referred to, without interfering with its normal and familiar operation and use; but my invention is not limited in its application or scope to the Burroughs machine, but may be embodied in other machines of the same general class for the same purposes and with the same results.

In the accompanying drawings Figure 1 represents in left side elevation the interior mechanism of a machine of the Burroughs type with the present improvements embodied therein, all the parts being at normal; Fig. 2 represents a right-side elevation of the interior mechanism of said machine, some parts being omitted for the sake of clearness; Fig. 3 is a sectional left-side elevation of a portion of the mechanism illustrating certain transfer devices; Fig. 4 is a front elevation of that portion of the mechanism illustrated in Fig. 3; Fig. 5 illustrates certain of the parts in left-side elevation as the same would appear with the usual total key depressed, dotted lines illustrating what takes place when said key is released and rises at the end of the forward stroke of the operating handle; Fig. 6 is a left-side elevation of parts of the mechanism illustrating their relative positioning when a clearing key is depressed, dotted lines illustrating changed relations of parts at the end of the forward stroke of the operating handle; Fig. 7 is a left-side elevation of certain parts illustrating their relative positioning when the grand total key is depressed, dotted lines showing what takes place when the operating handle reaches the forward end of its initial stroke; Fig. 8 is a sectional left-side elevation of certain parts of the mechanism

under the same conditions as represented in Fig. 7; Fig. 9 is a view similar to Fig. 8 but illustrating the operation of the parts under a different condition, viz., when a transfer is taking place in the auxiliary or grand accumulator; Fig. 10 is a detail elevational view illustrating the action of certain parts when the grand total key is depressed, such parts having to do with the displacement of the ordinary transfer pawls; and Fig. 11 shows certain parts of the mechanism in left-side elevation as the same would appear when the clearing key is depressed and the operating handle at the forward end of its initial stroke, dotted lines illustrating what takes place when the handle returns to normal position.

As before stated the invention is here shown as applied to the well-known Burroughs adding and listing machine and although that machine is well-known through extensive commercial use and through various prior patents, nevertheless it will greatly assist in explaining the present invention to enumerate many familiar parts of such machine before proceeding to a description of the new parts employed for carrying out the present invention.

The reference numeral 291 designates the usual amount keys whose depression positions stops which determine the extent of movement of segmental racks 610 which are mounted upon the forward ends of levers 611. The latter are loosely hung upon a central cross-shaft 600 and extend in rear thereof and carry at their rear ends segmental series of type plates 618 bearing type for printing numbers from 1 to 9. When the operating handle of the machine is drawn forward a frame 613 carried by the shaft 600 is lowered and racks 610 associated with any banks of amount keys in which keys have been depressed will follow the said frame and until they bring up against the stops set by the depressed keys. The corresponding upward movement of the rear ends of the levers positions type opposite the plates 1798 for the printing of the amount represented by the depressed keys. The printing is effected as the handle reaches the end of its forward stroke by the percussive action of pivoted hammers 715, the latter being driven rearward by drivers 716 under the impulse of springs 780. A bail composed of side-pieces 712 and a cross-rod 757 normally engages the hammer drivers but as the operating handle is drawn forward this bail is lifted through the medium of a link 820 connecting the bail with a crank plate 814 on a rock-shaft 800. The hammer drivers are, however, restrained by latches 717 and are not released until the operating handle is about at the end of its forward stroke. The latches 717 are controlled by pawls 718 carried by a swinging frame 700 and controlled by the levers 611

through engagement of the tails of said pawls with inclined shoulders on said levers. Thus when no key in a bank is depressed and consequently no movement of the corresponding lever 611 takes place the pawl associated with that lever will be raised above the notch of the associated latch and will not lift the same as the frame 700 swings forward. On the other hand, when the lever 611 is moved by reason of the depression of a key in the corresponding bank the associated pawl 718 is not so displaced but as the frame 700 swings forward will lift the associated latch. Each latch 717 except the extreme left-hand one is overlapped at its forward end by a laterally turned tail of the latch next to the left so that when any latch except the extreme right-hand one is lifted by its pawl 718 all the latches to the right will be lifted whether or not levers 611 corresponding with all such latches have been moved. In this way the filling in of ciphers is provided for in decimal places where no digits occur.

The racks 610 cooperate with pinions 916 strung along a cross-rod or shaft which is carried between side-plates 910<sup>a</sup> and 910<sup>b</sup>, these side-plates together with suitable tie-pieces and intermediate plates making up a frame which rocks upon a shaft 900 for the purpose of engaging the pinions with and disengaging them from the racks. In an ordinary operation of the machine for adding an item or amount these pinions remain out of mesh with the racks during the forward stroke of the operating handle and the consequent downward swing of the racks. Then as the handle starts rearwardly the pinions are brought into mesh with the racks so as to partake of their movements in returning to normal. In the operation of taking a total the pinions remain in mesh with the racks during the forward stroke of the operating handle so that the downward swing of the racks will turn the pinions backward until they reach zero positions. Then if the pinions are to remain at zero they are disengaged from the racks so that the latter may return to normal without affecting the pinions. If on the other hand, a sub-total is desired the pinions remain in mesh with the racks throughout the operation so that having been turned backward to zero and the total printed they will be again turned forward so as to display the same accumulation as before being turned backward.

The customary means for controlling the rocking of the accumulator frame comprise a pitman 914 forked or branched at its forward end to engage studs 958 and 958<sup>a</sup> on the rocking frame, a three-armed plate or lever 913 rocking upon a suitable stud and having its depending arm jointed to said pitman, and a rock-arm of lever 813 carried by the rock-shaft 800 and having pivoted to its upper end a spring-held wipe-plate or pawl 821

for coöperating with studs 961 and 961<sup>a</sup> on the oppositely extending arms of the plate or lever 913. The pitman is connected by a link 911 with a bell crank lever 227 drawn forward and upward by a spring 280 which thus serves to engage a notch of the upper branch of the pitman with the stud 958<sup>a</sup>. This is the normal condition which provides for the pinions 916 being moved out of mesh with the racks at the outset of an operation and into mesh therewith as the handle starts rearward. The bell crank lever 227 has an upstanding arm at its forward end surmounted by a key 293 which is ordinarily termed the total key and whose depression results in disengaging the pitman from the stud 958<sup>a</sup> and bringing the hook of the lower branch of said pitman to rest upon the lower stud 958. The link 911 and bell crank 227 have a slot-and-pin connection so that when the total key has been depressed and the handle is drawn forward the resultant forward thrust of the pitman will cause the latter's hook to drop by gravity over the stud 958. Then if the key is held down while the handle returns to normal this hook acting against the stud 958 will rock the accumulator frame and disengage the pinions from the racks. If on the other hand the key is released and allowed to rise before the handle starts on its rearward stroke the pitman will be lifted and its hook carried above said stud so that the pinions will remain engaged with the racks and consequently will be turned forward to restore the accumulation.

All of the above enumerated parts are familiar ones in the Burroughs machine and their several functions are retained in the machine of the present invention except that when a sub-total manipulation of the key 293 is performed the accumulation is not preserved by the pinions 916 for the addition thereto of further amounts but the accumulation is transferred to an auxiliary accumulator and the primary accumulator cleared before starting a new list or series of items or amounts. This auxiliary accumulator is composed of a series of pinions 916<sup>a</sup> adapted to mesh with the pinions 916 and having the same numbers of teeth, said pinions 916<sup>a</sup> being carried by a rocking frame composed of side plates 910<sup>a</sup> and suitable intermediate plates and tie-pieces. This rocking frame is pivoted upon the shaft 900 and normally occupies a lowered position with the pinions 916<sup>a</sup> separated from the pinions 916 as shown in Fig. 1. A lock-frame 920 similar to that usually employed to lock the pinions 916 is pivoted upon the shaft 900, its locking dogs 926 engaging the teeth of the pinions 916<sup>a</sup> when the latter are disengaged from the pinions 916, thereby preventing any accidental turning of said pinions 916<sup>a</sup>. When the pinions 916 are rocked out of mesh with the racks 610 either in an itemizing opera-

tion or in the clearing of the pinions 916 either with or without the printing of the total therefrom, the pinions 916<sup>a</sup> serve to lock the pinions 916, being themselves locked by the dogs 916.

In order to transfer the accumulation of the primary pinions to the auxiliary pinions it is of course essential that the latter shall be unlocked and brought into mesh with the primary pinions as the operating handle starts back toward normal under a sub-total manipulation of the key 293. Therefore said key is equipped with means whereby in rising it can draw the pinions 916<sup>a</sup> into mesh with the pinions 916. An elongated bent bar 293<sup>a</sup> is pivoted at its upper end to the bell crank lever 227 preferably by the same stud which connects said lever with the link 911, and at its lower end said bar is formed as a hook to engage a stud 910<sup>b</sup> projecting from one of the side-plates 910<sup>a</sup> of the auxiliary accumulator frame. Normally an edge of said bar below the hook rests against the front side of this stud as illustrated in Fig. 1, the bar being drawn rearwardly by a light spring 281. When the key 293 is depressed the hook bar 293<sup>a</sup> is lowered and its hook carried some distance below the stud 910<sup>b</sup> as shown in Fig. 5. Then when the key 293 rises the hook engages the underside of said stud as illustrated in dotted lines in Fig. 5 and the frame 910<sup>a</sup> is lifted and the pinions 916<sup>a</sup> carried into engagement with the pinions 916. Therefore as the latter pinions are turned forward the pinions 916<sup>a</sup> will be correspondingly rotated and the accumulation of said pinions 916 will be transferred to the pinions 916<sup>a</sup>. In order to guard against any possibility of the two sets of pinions getting out of register in this operation or the occurrence of any independent movement of the pinions 916<sup>a</sup> the lock frame 920 is preferably caused to follow the pinions 916<sup>a</sup> until their teeth have entered between the teeth of the pinions 916 or vice versa. To this end catches 927 are pivoted upon the side-plates 910<sup>a</sup> their hook-shaped lower ends being drawn by springs 980 under studs 920<sup>a</sup> on the lock-frame. The upper ends of these catches are formed with cam edges 927<sup>a</sup> and studs 927<sup>b</sup> project from the inner sides of the frame-work of the machine in position to be encountered by said cam edges as the frame 910<sup>a</sup> rises. Thus the lock-frame 920 will be drawn upward with the frame 910<sup>a</sup> for a distance with the pinions 916<sup>a</sup> locked by the dogs 926. Then as the pinions 916<sup>a</sup> come into complete mesh with the pinions 916 the catches 927 will be displaced through the co-operation of the cam edges 927<sup>a</sup> and the studs 927<sup>b</sup> whereupon the lock-frame lowers and the pinions 916<sup>a</sup> are left free to rotate. It will be understood in this connection that said lock-frame is as usual jointed to the lever 917 (Fig. 2) which as usual is spring-

pressed into engagement with the V-shaped lower end of the side-plate 910<sup>L</sup> of the primary accumulator frame, the spring pressure likewise tending to lower the lock-frame 920.

5 The accumulation of the primary pinions having been transferred to the auxiliary pinions in the manner above described, the primary pinions can again be employed for the accumulation of a new series of items  
10 whose total is eventually to be transferred to the auxiliary pinions and added to the accumulation previously transferred thereto. The mere act of drawing forward the operating handle will restore the parts to normal  
15 because the rocking of the primary pinions out of mesh with the racks will necessarily result in lowering the auxiliary pinions, means being provided for disengaging the hook bar 293<sup>a</sup> from the stud 910<sup>b</sup> at the outset of such operation. Then upon the re-  
20 turn of the operating handle and the movement of the primary pinions into mesh with the racks they would be separated from the auxiliary pinions 916<sup>a</sup>, the latter being left  
25 locked to the dogs 926 and preserving the accumulation transferred to them from the primary pinions. The means for disengaging the hook bar 293<sup>a</sup> as above mentioned are of the following description: A lever 293<sup>b</sup>  
30 is pivoted intermediate its length upon a cross-shaft 904 and at its forward end enlarged and angularly slotted as at 293<sup>c</sup> for engagement with a stud 293<sup>d</sup> on the hook bar. At its rear end this lever 293<sup>b</sup> overlies  
35 a stud 293<sup>e</sup> on the wipe-plate 821. Consequently, as the handle starts forward and the rock-arm 813 moves rearward the rearward end of the lever 293<sup>b</sup> is lifted and its forward end depressed. Under normal con-  
40 ditions this would be an idle movement because the stud 293<sup>d</sup> would be in alinement with the upper part of the angular slot 293<sup>c</sup>. However, when the total key 293 is depressed said stud travels down the lower part of said  
45 angular slot and when said key rises drawing upward the auxiliary accumulator frame it does not rise quite to its full height and said stud 293<sup>d</sup> does not reach a position of aline-  
50 ment with the upper part of said angular slot. Consequently, when the handle is thereafter drawn forward the cam edge uniting the inner sides of the two portions of  
said angular slot will act against the stud 293<sup>d</sup> and force the hook bar 293<sup>a</sup> forward to  
55 its normal position whereupon the stud 910<sup>b</sup> is relieved from the restraint of the hook and may pass down along the lower rear edge of the hook bar, the auxiliary accumulator frame dropping and being followed by the  
60 primary accumulator frame.

The operation above described would of course leave the primary pinions containing the accumulation and the purpose of the invention being to provide for starting anew  
65 with accumulation of items it becomes neces-

sary to clear the primary pinions before further amounts are set up on the keyboard. To this end a special clearing key 295 is provided the same being mounted upon the upstanding  
70 end of a bell crank lever 227<sup>b</sup> secured to a rock-shaft 208 extending across beneath the rear part of the keyboard. The depending arm of the bell crank 227 is connected by a  
75 link 226<sup>a</sup> to an arm 227<sup>a</sup> secured to a rock-shaft 206 extending parallel with the rock-shaft 208 and forming part of such means as shown in said Macauley patent for effecting  
the printing of a special character to designate a total. In the present instance said  
80 arm 227<sup>a</sup> is availed of for the purpose of causing depression of the key 295 to produce the same results as depression of the key 293. Thus the lower branch of the bell crank 227<sup>b</sup>  
extends in front of a stud 227<sup>c</sup> on said arm 227<sup>a</sup> as shown in Fig. 1. Therefore depres-  
85 sion of the key 295 by drawing rearward the arm 227<sup>a</sup> will, through the medium of the link 226<sup>a</sup>, operate the bell crank 227 and connected parts the same as though the key 293  
were depressed for the taking of a total from  
90 the primary pinions. However, that total was procured when said key 293 was depressed and the handle drawn forward and there would be no occasion for again printing such  
95 total and furthermore as will hereinafter appear, it would not in some instances be a true total for increments of movement will be imparted to the primary pinions in con-  
nection with transfer operations on the aux-  
100 iliary pinions, the primary pinions then serving merely as transmitting gears between the auxiliary pinions and the racks. Therefore the special clearing key 295 coöperates with  
devices which disable the printing mechanism so that when the primary pinions are  
105 being cleared merely to prepare them for accumulating a new set of items or amounts and not for the purpose of printing a total no printing will take place.

It has been before explained that an im-  
110 print is obtained from the type by lifting the latches 717 through the medium of the pawls 718 and it was mentioned that this lifting of latches takes place in an ordinary operation  
and of course the same is true as to a total-  
115 printing operation, at an advanced stage, i. e., when the bail 712-757 is elevated. Now it will be obvious that if the latches are lifted at the outset of an operation of the machine  
before the bail has lifted them the hammer  
120 drivers and hammers will simply follow the bail as it lifts and there will be no percussive action and hence no printing. The devices above referred to as under control of the  
special clearing key 295 for eliminating the  
125 printing operate to effect this early release of the hammers. A lever 760 is pivoted intermediate its length upon one side of the frame supporting the printing devices as shown in  
Fig. 1 and the lower end of said lever is given  
130

a cam formation and held by a spring 781 in engagement with a roller 814<sup>a</sup> mounted upon the rock-plate 814. It will be understood that the latter oscillates in every operation of the machine. As the portion carrying the roller 814<sup>a</sup> swings downward accompanying the forward stroke of the operating handle said roller acting against the cam edge of the lever 760 rocks said lever against the stress of its spring 781. Then as the rock-plate returns to normal with the return stroke of the operating handle said lever is restored to normal by said spring. The upper arm of the lever carries a catch-bar or hook 761 which at its rear end is adapted to engage a stud 760<sup>a</sup> on the furthest latch 717 to the left. Normally, however, this hook rides idly back and forth above said stud as the lever 760 vibrates. A spring 782 connecting said lever and said hook tends to draw the latter into engagement with the stud but such engagement is normally prevented through the agency of the following described means: The rock-shaft 208 heretofore mentioned carries a depending arm 295<sup>a</sup> which at its lower end has a stud 761<sup>b</sup> occupying the narrow forward end of an irregular slot 761<sup>c</sup> in a forwardly-projecting portion of the hook 761. Lowering of the rear end of said hook is normally prevented by the engagement of the lower side of the narrow front portion of said irregular slot with said stud 761<sup>b</sup>. However, when the key 295 is depressed the arm 295<sup>a</sup> is swung rearwardly and the stud 761<sup>b</sup> carried into a wider part of the slot 761<sup>c</sup>. Then the hook 761 drops over the stud 760<sup>a</sup> as shown in Fig. 6 and when the lower end of the lever 760 is swung rearward and its upper end consequently swung forward, which takes place at the outset of the operation of the machine, said hook lifts the latch 717 and through the medium of the overlapping tails heretofore mentioned lifts all of the latches. In this way the printing is eliminated for the hammers and their drivers will simply follow the bail 712-757 and there will be no percussive action.

Of course the key 295 must remain depressed throughout the operation of the machine so that the primary pinions 916 will be left at zero. Consequently, means are provided for automatically latching down said key and holding it down until the operation of the machine comes to a close. To this end there is suspended from the bell crank 227<sup>b</sup> a pivoted latch 227<sup>d</sup> drawn forward by a spring 282 so that when the key is fully depressed the latch will be engaged under a fixed stud 227<sup>e</sup> on the frame of the machine as shown in Fig. 6. The means for unlatching this special clearing key will be hereinafter described because the same means are employed for unlatching another key which causes the return of the auxiliary pinions to zero and the printing of the grand

total accumulated thereon. This grand total key is designated by the numeral 296 and it surmounts an upstanding arm of an elbow lever 296<sup>a</sup> which is loosely mounted upon the shaft 208 and carries a stud 296<sup>b</sup> to act against the arm 227<sup>a</sup>. Thus it will be seen that depression of the key 296 causes the key 293 and its connections to be operated the same as though that key were directly manipulated. It will of course be understood that the turning of the auxiliary pinions to zero must be effected through the medium of the primary pinions, the latter acting as transmitting gears between the racks and the auxiliary pinions. Hence the primary accumulator frame must be controlled the same as when a total is being taken from the primary pinions or in other words the same as when the key 293 is directly depressed and so held throughout an operation of the machine. As in the taking of a total the primary wheels must remain in mesh with the racks during the forward stroke of the operating handle. It is of course essential that depression of the grand total key 296 shall draw the auxiliary pinions into mesh with the primary pinions and keep them in mesh therewith during the forward stroke of the operating handle. To this end and as more clearly shown in Fig. 7 the elbow lever 296<sup>a</sup> is connected by a link 296<sup>c</sup> with a lever 296<sup>d</sup> and the latter carries at its forward end a hook bar 296<sup>e</sup>, the hooked lower end of which normally engages below the stud 910<sup>b</sup> as shown in Fig. 1. The lever 296<sup>d</sup> is pivoted intermediate its length and it will be obvious that upon depression of the key 295 and consequent elevation of the forward end of said lever the frame 910<sup>a</sup> will be lifted and the pinions 916<sup>a</sup> brought into mesh with the pinions 916. It being essential that the key 296 shall remain depressed throughout the operation of the machine it becomes necessary to provide means for disengaging the hook bar 296<sup>e</sup> from the stud 910<sup>b</sup> when the operating handle reaches the end of its forward stroke, so that the auxiliary pinions may become disconnected from the racks and remain at zero. This hook bar is therefore connected by a link 296<sup>f</sup> with an arm 918 secured to a rock-shaft 904 and connected by a link 918<sup>a</sup> with the rock-arm 813. The rear end of said link is enlarged and formed with a slot which embraces a stud on said rock-arm so that no movement of the link takes place until the rock-arm is concluding its rearward swing. The rearward movement of the link which then ensues swings the arm 918 rearward and draws the link 296<sup>f</sup> rearward, disengaging the hook bar 296<sup>e</sup> from the stud 910<sup>b</sup>, whereupon the auxiliary pinions 916<sup>a</sup> drop out of mesh with the primary pinions 916. As the operating handle starts back said primary pinions disengage from the racks in

the usual way but they would not then be standing at zero because the dropping of the racks was measured by the zero stops or transfer trips pertaining to the auxiliary or grand total pinions 916<sup>a</sup> and not by the zero stops or transfer trips pertaining to the primary pinions 916. This immediately suggests the necessity for displacing the latter zero stops or transfer trips when a grand total is to be taken and means for this purpose controlled by the grand total key 296 will presently be described. Such description will, however, be prefaced by a description of the transfer devices employed for the two sets of accumulating pinions. The actuating racks 610 have as usual a slot-and-pin connection with the levers 611 and are drawn upwardly by springs 680 as shown in Fig. 3. Movements of the racks by said springs is normally prevented by the abutment of studs 651 on the racks against studs 413<sup>a</sup> on swinging transfer trip frames 413, the latter having the usual beveled lugs 413<sup>b</sup> for coöperation with pins 916<sup>c</sup> on the pinions 916. The transfer operation brought about through these devices is the familiar one in Burroughs machines. As the rack engaged with the pinion to which a transfer is to be made may be returning to normal at the time the pin of the next lower wheel removes the studs 413<sup>a</sup> from the path of the stud 651 on the rack of the higher wheel, latches 411 are employed as usual to hold the transfer trip frames 413 displaced so that the studs 413<sup>a</sup> will remain out of the path of the studs 651.

Now it will be understood that when a second accumulation is transferred to the auxiliary pinions transfers from one to another of the latter may become necessary and indeed are bound to become necessary in any supposable practical use of the machine. However, the same transfer devices above described can be and are utilized for effecting transfers between the auxiliary pinions. To this end the depending arms of the trip frames 413 are extended beyond the transfer lugs 413<sup>b</sup> and at their lower extremities have lateral projections as indicated by dotted lines in Fig. 3, which projections overlie the inclined rear edges of levers 413<sup>c</sup> pivoted in the auxiliary accumulator frame and pressed downwardly as to their rear ends and upwardly as to their forward ends by springs 480. The forward ends of these levers are formed similarly to the lugs 413<sup>b</sup> for co-action with pins 916<sup>d</sup> on the auxiliary pinions 916<sup>a</sup>. Thus as one of the latter pinions completes a rotation its pin acting upon the inclined edge of the forward end of the associated lever 413<sup>c</sup> depresses the same and by elevating its rear end effects the same displacement of the transfer trip frame 413 as caused by the action of the pin 916<sup>c</sup> of the associated

primary pinion 916 against the lug 413<sup>b</sup>. Therefore with the auxiliary pinions 916<sup>a</sup> in mesh with the primary pinions 916 the racks 610 will operate to impart transfer movements to the auxiliary pinions in the same manner that said racks impart transfer movements to the primary pinions. Of course when an accumulation is being transferred from the pinions 916 to the pinions 916<sup>a</sup> the former necessarily start from zero position their pins 916<sup>c</sup> being in contact with the straight sides of the lugs 413<sup>b</sup>. Hence there will of course be no tripping of transfers by said pins 916<sup>c</sup>.

It will be understood that when a grand total is to be taken the movement of the racks is measured by backward rotation of the pinions 916<sup>a</sup> to zero and this backward rotation of the pinions 916<sup>a</sup> is limited by the abutment of the pins 916<sup>d</sup> against the forward ends of the levers 413<sup>c</sup> as illustrated in Fig. 8. As heretofore mentioned the primary pinions 916 in such operation must merely operate as transmitting gears and not in any way to measure the movement of the racks. Consequently means are provided for causing the depression of the grand total key 296 to move the lugs 413<sup>b</sup> out of the paths of the pins 916<sup>c</sup> on the primary pinions. The means here shown comprise a series of arms 296<sup>s</sup> loosely hung upon the studs which support the transfer trip frames 413 and designed to act upon the studs 413<sup>a</sup> respectively for the purpose of carrying the lugs 413<sup>b</sup> clear of the pins 916<sup>c</sup>. As the pinion 916 furthest to the left of course is not required to trip any transfer mechanism the frame 413<sup>d</sup> associated with it and supplying a zero stop has no lug 413<sup>a</sup>. Consequently, a special arm 296<sup>t</sup> is employed in this instance, the same having a laterally bent lower end to overlie the frame 413<sup>d</sup> as shown in Fig. 4. All of the arms 296<sup>s</sup> and the arm 296<sup>t</sup> have rearwardly extending portions as shown in Figs. 8 and 9 overlying a cross-rod 296<sup>g</sup> extending between two side-bars 296<sup>h</sup> hung from suitable studs below the keyboard as shown in Figs. 1 and 10. This cross-rod 296<sup>g</sup> has attached to its middle portion a link 296<sup>i</sup> (Fig. 10) which is connected with a crank arm 296<sup>j</sup> secured to a shaft 200, the latter carrying at its left-hand end a depending arm 296<sup>k</sup> coupled by a link 296<sup>m</sup> with the elbow lever 296<sup>a</sup>. Through these connections depression of the key 296 is caused to slightly elevate the cross-rod 296<sup>g</sup> as illustrated in Fig. 10 and thereby swing all of the arms 296<sup>s</sup> rearwardly as well as the arm 296<sup>t</sup> and thus remove all of the stop lugs 413<sup>b</sup> from the paths of the pins 916<sup>c</sup>. Said arms 296<sup>s</sup> and 296<sup>t</sup> are preferably provided with clips 296<sup>n</sup> extending under the cross-rod 296<sup>g</sup> so that if a arms will move in both directions therewith although of course the springs 481

which return the transfer trip frames 413 might be relied upon to return said arms when the latches 411 are restored to normal.

It will be understood that in the regular Burroughs machine the latches 411 are restored to normal at the end of the forward stroke of the operating handle through the medium of a bail composed of side arms 904<sup>a</sup> secured to the shaft 904 and a cross-rod 904<sup>b</sup>. Of course when the transfer trip frames are all moved rearwardly through depression of the key 296 in the manner already described their forwardly extending portions will escape from the notches of the latches 411 the same as when said frames are moved rearwardly in transfer operations, and the latches 411 engaging over said forwardly projecting portions of the trip frames will hold the latter displaced. The displacement of these trip frames would ordinarily result in transfers taking place but this is prevented when the grand total key 296 is depressed, by reason of the fact that the arms 296<sup>a</sup> engage over the studs 651 as the studs 413<sup>a</sup> retreat from said studs 651. Thus no movement of the accumulator pinions is permitted as the auxiliary set come into mesh with the primary set and the grand total accumulated on the auxiliary set of pinions is not disturbed.

The key 296 is held down by a latch 296<sup>x</sup> drawn by a spring 296<sup>y</sup> into engagement with a fixed stud 296<sup>z</sup> on the framework. This latch is displaced at the conclusion of an operation of the machine through the same means as operate to displace the previously mentioned latch 227<sup>d</sup>. Thus a latch-displacing bar 860 is pivoted to the upper end of an arm 861 and the lower end of said arm carries a stud 862 against which the upper end of the rock-arm 813 bears normally thrusting the bar 860 toward the rear against the stress of a spring 880. Said bar 860 embraces the shaft 600 for guiding purposes, the opening in the bar being large enough to permit both longitudinal and up and down movement of the bar. A spring 881 operates to lift the rear end of the bar and thus engage two inclined lugs 860<sup>a</sup> and 860<sup>b</sup> thereon with studs 863 on the two latches 227<sup>d</sup> and 296<sup>x</sup>. Thus whenever either of the keys 295 or 296 is depressed its stud 863 comes down on the top of one of the other of the inclined lugs and depresses the bar 860 against the stress of its spring 881. As the handle starts forward and the rock-arm 813 moves rearward the spring 880 rocks the lever 861 and thus the inclined lug is drawn forward and then the spring 881 moves said lug up in front of the stud 863. As the operation of the machine concludes the rock-arm 813 acts against the stud 862 and thrusts the bar 860 rearward. Thus one or the other of the lugs 860<sup>a</sup> or 860<sup>b</sup> will dis-

place the latch 296<sup>x</sup> or 227<sup>d</sup> as the case may be and release the depressed key.

The depression of the key 296 as already stated results in depression of the key 293 also and hence in the same downward movement of the hook bar 293<sup>a</sup> as takes place when the said key 293 is directly depressed. It will be recalled that when the latter operation is performed the said hook bar engages under the stud 910<sup>b</sup> so that in the return of the key 293 the auxiliary accumulators 916<sup>a</sup> are drawn into mesh with the pinions 916. However, this does not take place in the case of depression of the key 293 by the key 296. Means are provided to prevent any such result because if permitted the auxiliary accumulator would not be left at zero as desired. It will be recalled that the depression of the key 296 displaces all of the transfer trip frames 413 and although the displacing arms 296<sup>a</sup> prevent transfer movements of the racks in the manner already described, yet with the rise of the key 296 at the conclusion of the machine's operation these arms are of course restored to normal positions forwardly beyond the studs 651. With this restoration the racks are freed for transfer movements the transfer trip frames being still held back by the latches 411. Resultant movement of the primary pinions is of no moment because they have merely been acting as transmitting gears and must be separately returned to zero anyway before further operations of the machine. However, such transfer movements would be disastrous if transmitted to the auxiliary pinions which should of course be left at zero at the conclusion of a grand totalizing operation. It is true that the primary pinions are not in mesh with the racks during the return of the latter to normal but just as the operating handle reaches the end of its rearward stroke the primary pinions are rocked into mesh with the racks as in the regular Burroughs machine, this being effected by the action of a roll 311<sup>a</sup> (carried by the usual full stroke sector 311) upon a rearwardly extending arm 910<sup>x</sup> of the primary accumulator frame, see Fig. 2. This takes place at about the same time that the key 296 is being released, consequently the primary pinions will be in mesh with the racks at the time when the arms 296<sup>e</sup> move from over the studs 651. Now in order to prevent the pinions 916<sup>a</sup> from being drawn into engagement with the pinions 916 as the key 296 rises the link 296<sup>f</sup> is provided with a stud 296<sup>p</sup> adapted to co-operate with a cam edge 293<sup>x</sup> on the hook bar 293<sup>a</sup>. When the key 296 is depressed said link 296<sup>f</sup> is elevated with the hook bar 296<sup>e</sup> while the hook bar 293<sup>a</sup> is being lowered and the resultant co-action between the stud 296<sup>p</sup> and the cam edge 293<sup>x</sup> will cause said hook bar 293<sup>a</sup> to be thrown forward out of

line with the stud 910<sup>b</sup> as shown in Fig. 7. The combined effect of the rise of the link 296<sup>f</sup> and the lowering of the hook bar 293<sup>a</sup> is to bring the stud 296<sup>p</sup> into engagement with the rear edge of said hook bar 293<sup>a</sup> a short distance above the cam edge 293<sup>x</sup>. It will thus be seen that while depression of the key 296 may result in causing the hook of the bar 293<sup>a</sup> to momentarily engage under the stud 910<sup>b</sup>, when said key 296 is fully depressed, said hook will be held out of line with said stud. At the time when the key 296 is released the auxiliary accumulator frame is in its lowest position and the stud 910<sup>b</sup> is very slightly above the line of the transverse edge of the hook. Now the latter is held out long enough through the engagement of the stud 296<sup>p</sup> with the cam edge of the hook bar 293<sup>a</sup> to prevent the hook of the latter engaging under the stud 910<sup>b</sup> as it rises, said bar 293<sup>a</sup> simply striking against the stud and riding up the front side of the latter. When the key 293 is alone depressed there is not the same co-action between the stud 296<sup>p</sup> and the cam edge of the bar 293<sup>a</sup> because said stud does not move. It will be understood that the spring 281 holding the hook bar 293<sup>a</sup> rearward is lighter than the spring 288 which draws the link 296<sup>f</sup> forward. Furthermore, any tendency of the cam edge 293<sup>x</sup> to thrust said link rearwardly would be resisted by the spring 988 which draws the arm 918 forward.

Reference has heretofore been made to devices for camming the hook bar 293<sup>a</sup> out of engagement with the stud 910<sup>b</sup> in a blank or itemizing operation of the machine following an operation for transferring an accumulation from the primary to the grand total pinions. Means are provided to prevent undue vibration of said hook bar as might otherwise take place through the operation of said camming devices with anyone of the three keys 293, 295 or 296 depressed. The depression of any one of these keys carries the stud 293<sup>d</sup> (Fig. 1) down the lower portion of the cam slot 293<sup>c</sup>. Consequently vibration of the lever 293<sup>b</sup> would result in an excessive outward throw of the hook bar 293<sup>a</sup>. It is not necessary that there should be any action of the cam head of the lever 293<sup>b</sup> upon the hook bar 293<sup>a</sup> when any one of the keys 293, 295 or 296 is depressed. Therefore said lever 293<sup>b</sup> is disabled by depression of any one of said keys. To this end the bell crank lever 227 carries a depending arm 227<sup>x</sup> which swings rearwardly when said bell crank is rocked by depression of any one of the keys 293, 295 or 296 and in so swinging rearwardly acts against the stud 293<sup>e</sup> and thus displaces the wipe-pawl 821 carrying said stud beyond the end of the lever 293<sup>b</sup> and thus preventing any movement of said lever by said wipe pawl. This displacement of the wipe pawl 821 does not disturb the regular

operations of the pitman 914. When the total key is depressed it is only necessary that the hook of the lower branch of said pitman shall engage the stud 958. Gravity alone may be sufficient to bring about this engagement, the cam edge of the pitman sliding over the front side of the stud. But the displacement of the wipe pawl 821 is not carried so far as to prevent its co-action with the stud 961 if need be to move the pitman 914 slightly forward if it does not so move through gravity and effect the necessary engagement between the stud 958 and the hook of the pitman.

The usual latches 415 normally support the racks 610 and said latches are as usual individually displaced through the medium of detent strips 214 operated upon by the amount keys. Also the usual universal cross-rod 204 extends in front of the latches and this cross-rod is connected by links 226 to the bell crank 227 and an arm 227<sup>x</sup> on the right-hand end of the shaft 202 to which the said bell crank is secured. It will thus be obvious that depression of the total key 293 withdraws all the latches from engagement with the racks as usual and a similar result is brought about by the depression of either of the keys 295 and 296.

It will now be seen that the above described construction provides for the accumulation of a series of items or amounts, the printing of the total thereof, the transfer or duplication of the accumulation in a separate set of counter-wheels or pinions and indefinite repetition of this procedure whereby a grand total is obtained representing the sum of all of the individual accumulations. It will furthermore be seen that such a grand total can at any time be printed. Thus it is made possible to print several lists of amounts with the several totals of such lists and a grand total representing the sum of the individual totals. All of the items and all of the totals may be printed in the same vertical column if desired or the different lists of items can be printed in separate columns where the laterally shiftable paper carriage such as shown in Fig. 2 is employed. Individual totals may appear as footings at the bottom of the several columns and the grand total may be printed off to one side or wherever desired. It will likewise be seen that items can, if desired, be printed one after another in a horizontal line by shifting the paper carriage and the accumulation of such items printed as a total at the end of such line, and that this operation can be repeated indefinitely. Then the grand total representing the sum of the various individual totals can be printed as a footing of the latter.

While the form of means here shown and described is well calculated to thoroughly fulfil the objects primarily stated, it will be obvious that considerable modification can

be made in the embodiment of the invention without departing from its scope.

What is claimed is:

1. In a machine of the character described, the combination of a set of actuators and two sets of accumulator wheels, motion being transmitted between the actuators and the wheels of one set through the medium of the wheels of the other set in either direction.

2. In a machine of the character described, the combination of a set of actuators and two sets of accumulator wheels geared together, motion being transmitted between the actuators and the wheels of one set through the medium of the wheels of the other set in either direction.

3. In a machine of the character described, the combination of a set of actuators and two sets of accumulator wheels, upon one of which sets of wheels successive items or amounts can be accumulated by repeated operation of said actuators and upon the other of which sets of wheels successive accumulations of the first set of wheels can themselves be accumulated, motion being transmitted to the last mentioned set of wheels through the medium of the first mentioned set of wheels.

4. In a machine of the character described, the combination of a set of actuators and two sets of accumulator wheels, upon one of which sets of wheels successive items or amounts can be accumulated by repeated operation of said actuators and upon the other of which sets of wheels successive accumulations of the first set of wheels can themselves be accumulated, motion being transmitted to the last mentioned set of wheels through the medium of the first mentioned set of wheels and the latter capable of being reset to zero without affecting the accumulation on the former.

5. In a machine of the character described, the combination of a set of actuators and two sets of accumulator wheels, upon one of which sets of wheels successive items or amounts can be accumulated by repeated operation of said actuators and upon the other of which sets of wheels successive accumulations of the first set of wheels can themselves be accumulated, motion being transmitted to the last mentioned set of wheels through the medium of the first mentioned set of wheels and the latter capable of being reset to zero without affecting the accumulation on the former which is itself capable of being reset to zero.

6. In a machine of the character described, the combination of a set of actuators, two sets of accumulator wheels geared together, motion being transmitted between the actuators and the wheels of one set through the medium of the wheels of the other set in either direction, and means for locking one set of wheels while the other is in gear with it.

7. In a machine of the character described,

the combination of a set of actuators, two sets of accumulator wheels, motion being transmitted between the actuators and the wheels of one set through the medium of the wheels of the other set in either direction, and means for locking one set of wheels by the other.

8. In a machine of the character described, a set of reciprocating actuators, means for measuring the excursions thereof, two sets of accumulator wheels movable out of and into engagement with said actuators and one deriving motion from the latter through the medium of the other, means for regulating the periods of engagement and disengagement between accumulator wheels and actuators to provide for successive accumulation of amounts by one set of wheels through repeated operation of the actuators or for the turning of those wheels to zero, together with means for controlling relationship between the other set of wheels and the actuators for causing an accumulation on the first set to be transferred thereto or said other set of wheels to be turned to zero.

9. In a machine of the character described, the combination of a set of reciprocating actuators, printing type arranged to be set thereby, two sets of accumulator wheels, one exerting a control over the other, means for variously measuring excursions of said actuators for accumulating successive items or amounts on one set of wheels, and controlling devices whereby successive accumulations of said wheels may be transferred to the other set of wheels by the actuators, and either set of wheels may be turned to zero to set up totals by the printing type.

10. In a machine of the character described, the combination of a set of reciprocating actuators, printing type arranged to be set thereby, two sets of accumulator wheels movable into and out of engagement with the actuators, one exerting a control over the other, means for variously measuring excursions of said actuators for accumulating successive items or amounts on one set of wheels, and means for regulating the periods of engagement between accumulator wheels and actuators and the control of one set of wheels by the other to effect item accumulation, transfer of accumulation between the sets of wheels, or the setting up of totals of accumulation of either set by the printing type.

11. In a machine of the character described, a set of reciprocating actuators, means for measuring the excursions thereof, two sets of accumulator wheels movable out of and into engagement with said actuators and one deriving motion from the latter through the medium of the other, means for keeping the accumulator wheels out of engagement with the actuators during movement of the same from normal and keeping

said wheels engaged with the actuators during movement of the latter to normal, said means being adjustable to reverse the order of relationship between wheels and actuators, and a key for adjusting said means, said key having connections for controlling the transfer of accumulations between the two sets of wheels.

12. In a machine of the character described, the combination of a set of reciprocating actuators, a set of accumulator wheels engageable therewith and disengageable therefrom, means for effecting the engagement and disengagement of said wheels and actuators, a second set of wheels deriving motion from the actuators and the first set of wheels, and a key for controlling the order of engagement and disengagement of wheels and actuators and the transfer of accumulations between the two sets of wheels, said key rendering the second set of wheels operative to receive the total of the first set of wheels after the latter has been turned to zero.

13. In a machine of the character described, the combination of a set of actuators, two sets of accumulator wheels, motion being transmitted between the actuators and the wheels of one set through the medium of the wheels of the other set in either direction, means common to the two sets of wheels for imparting transfer or carrying movements thereto, and separate sets of transfer tripping devices, one set for each set of wheels.

14. In a machine of the character described, the combination of a set of actuators, two sets of accumulator wheels, motion being transmitted between the actuators and the wheels of one set through the medium of the wheels of the other set in either direction and the actuators being capable of extra movement for transfer purposes, and pawls normally preventing such extra movement, each set of wheels having tripping devices to displace said pawls.

15. In a machine of the character described, the combination of reciprocating carriers, racks thereon capable of limited independent movement, springs for effecting such movement, pawl preventing such movement, a set of accumulator wheels movable into and out of engagement with said racks and adapted to be turned thereby, said wheels equipped to displace said pawls, and a second set of accumulator wheels arranged to receive motion from the racks and the first set of wheels, and means whereby said second set of wheels may displace the pawls independently of the first set.

16. In a machine of the character described, the combination of reciprocating racks, a set of accumulator pinions movable into and out of engagement therewith, a second set of accumulator pinions movable into

and out of engagement with the first set, and means for varying the order of engagement and disengagement between the racks and the first set of pinions and the latter and the second set of pinions whereby successive items or amounts can be accumulated by the first set of pinions and the accumulation transferred to the second set of pinions and the latter subsequently turned to zero by the racks through the medium of the first set of pinions.

17. In a machine of the character described, the combination of reciprocating racks, a set of accumulator pinions movable into and out of engagement therewith, a second set of accumulator pinions movable into and out of engagement with the first set, and means for varying the order of engagement and disengagement between the racks and the first set of pinions and the latter and the second set of pinions whereby successive items or amounts can be accumulated by the first set of pinions, the latter turned to and left at zero by the racks or turned to zero and the accumulation immediately restored and duplicated in the second set of pinions, and the second set of pinions turned to zero by the racks through the medium of the first set.

18. In a machine of the character described, the combination of reciprocating racks, a set of accumulator pinions movable into and out of engagement therewith, a second set of accumulator pinions movable into and out of engagement with the first set, means for varying the order of engagement and disengagement between the racks and the first set of pinions and the latter and the second set of pinions whereby successive items or amounts can be accumulated by the first set of pinions and the accumulation transferred to the second set of pinions, and means for locking both sets of pinions against turning when disengaged from the racks.

19. In a machine of the character described, the combination of reciprocating racks, a set of accumulator pinions movable into and out of engagement therewith, a second set of accumulator pinions movable into and out of engagement with the first set, means for varying the order of engagement and disengagement between the racks and the first set of pinions and the latter and the second set of pinions whereby successive items or amounts can be accumulated by the first set of pinions and the accumulation transferred to the second set of pinions, and means for locking the second set of pinions against turning when disengaged from the first set of pinions, said means serving also to lock the latter against turning when disengaged from the racks.

20. In a machine of the character described, the combination of reciprocating

racks, a rock frame, a set of pinions in the latter adapted to be engaged with and disengaged from said racks by the rocking of said frame, a second rock frame concentric with the latter, a set of pinions in said second rock frame adapted to be engaged with and disengaged from the first set of pinions by the rocking of said second frame, and means for rocking both frames with provisions for variously timing the movements thereof whereby the racks may be caused to successively accumulate amounts on the first set of pinions without affecting the second set of pinions, or return said first set of pinions to zero leaving them so positioned or again advancing them to restore the accumulation simultaneously duplicating such accumulation in the second set of pinions.

21. In a machine of the character described, the combination of reciprocating racks, a rock frame, a set of pinions in the latter adapted to be engaged with and disengaged from said racks by the rocking of said frame, a second rock frame concentric with the latter, a set of pinions in said second rock frame adapted to be engaged with and disengaged from the first set of pinions by the rocking of said second frame, means for rocking the first mentioned frame with provisions for timing the movements so the racks may operate to successively accumulate amounts on the pinions in said frame or may return said pinions to zero and leave them so positioned or again advance them to restore the accumulation, and means for rocking the second frame to bring its pinions into mesh with those of the first frame for receiving the same accumulation as restored on the latter's pinions or for causing its own pinions to be turned to zero by the racks.

22. In a machine of the character described, the combination of reciprocating racks, a rock frame, a set of pinions in the latter adapted to be engaged with and disengaged from said racks by the rocking of said frame, a second rock frame concentric with the latter, a set of pinions in said second rock frame adapted to be engaged with and disengaged from the first set of pinions by the rocking of said second frame, means for rocking both frames with provisions for variously timing the movements thereof whereby the racks may be caused to successively accumulate amounts on the first set of pinions without affecting the second set of pinions, or return said first set of pinions to zero leaving them so positioned or again advancing them to restore the accumulation simultaneously duplicating such accumulation in the second set of pinions, and means for locking the latter set of pinions against turning when disengaged from the first set.

23. In a machine of the character de-

scribed, the combination of reciprocating racks, a rock frame, a set of pinions in the latter adapted to be engaged with and disengaged from said racks by the rocking of said frame, a second rock frame concentric with the latter, a set of pinions in said second rock frame adapted to be engaged with and disengaged from the first set of pinions by the rocking of said second frame, means for rocking both frames with provisions for variously timing the movements thereof whereby the racks may be caused to successively accumulate amounts on the first set of pinions without affecting the second set of pinions, or return said first set of pinions to zero leaving them so positioned or again advancing them to restore the accumulation simultaneously duplicating such accumulation in the second set of pinions, and means for locking the latter set of pinions against turning when disengaged from the first set, the latter being locked when disengaged from the racks by reason of engagement with the other set of pinions.

24. In a machine of the character described, the combination of reciprocating racks, a rock frame, a set of pinions in the latter adapted to be engaged with and disengaged from said racks by the rocking of said frame, a set of pinions in said second rock frame concentric with the latter, a set of pinions in said second rock frame adapted to be engaged with and disengaged from the first set of pinions by the rocking of said second frame, means for rocking both frames with provisions for variously timing the movements thereof whereby the racks may be caused to successively accumulate amounts on the first set of pinions without affecting the second set of pinions, or return said first set of pinions to zero leaving them so positioned or again advancing them to restore the accumulation simultaneously duplicating such accumulation in the second set of pinions, a third rock frame having a set of locks to engage the latter set of pinions, and means for rocking said third frame to carry it and the second frame toward the first frame as the latter carries its pinions away from the racks.

25. In a machine of the character described, the combination of reciprocating racks, a rock frame, a set of pinions in the latter adapted to be engaged with and disengaged from said racks by the rocking of said frame, a second rock frame concentric with the latter, a set of pinions in said second rock frame adapted to be engaged with and disengaged from the first set of pinions by the rocking of said second frame, means for rocking both frames with provisions for variously timing the movements thereof whereby the racks may be caused to successively accumulate amounts on the first set of pinions without affecting the second set of pinions,

or return said first set of pinions to zero leaving them so positioned or again advancing them to restore the accumulation simultaneously duplicating such accumulation in the second set of pinions, a third rock frame having a set of locks to engage the latter set of pinions, and means for causing said third frame to advance a distance with the second frame when the latter is carrying its pinions into engagement with those of the first frame.

26. In a machine of the character described, the combination of reciprocating racks, a rock frame, a set of pinions in the latter adapted to be engaged with and disengaged from said racks by the rocking of said frame, a second rock frame concentric with the latter, a set of pinions in said second rock frame adapted to be engaged with and disengaged from the first set of pinions by the rocking of said second frame, means for rocking both frames with provisions for variously timing the movements thereof whereby the racks may be caused to successively accumulate amounts on the first set of pinions without affecting the second set of pinions, or return said first set of pinions to zero leaving them so positioned or again advancing them to restore the accumulation simultaneously duplicating such accumulation in the second set of pinions, a third rock frame having a set of locks to engage the latter set of pinions, catches on the second frame engaging said third frame to carry the latter a distance with said second frame when the pinions of the latter are to be moved into mesh with the pinions of the first frame, and means for disabling said catches as the second set of pinions come to mesh with the first set.

27. In a machine of the character described, the combination of reciprocating racks, a rock frame, a set of pinions in the latter adapted to be engaged with and disengaged from said racks by the rocking of said frame, a second rock frame concentric with the latter, a set of pinions in said second rock frame adapted to be engaged with and disengaged from the first set of pinions by the rocking of said second frame, means for rocking both frames with provisions for variously timing the movements thereof whereby the racks may be caused to successively accumulate amounts on the first set of pinions without affecting the second set of pinions, or return said first set of pinions to zero leaving them so positioned or again advancing them to restore the accumulation simultaneously duplicating such accumulation in the second set of pinions, a third spring-held rock frame having locks to engage the latter set of pinions, catches on the second frame spring-drawn into engagement with the third frame to carry the same a distance with the second frame when the pinions of the latter are to be moved into mesh with the pinions of the first frame, and abutments for displacing said

catches as the second set of pinions comes to mesh with the first set.

28. In a machine of the character described, the combination of reciprocating racks, a set of accumulator pinions movable into and out of engagement therewith, a second set of accumulator pinions movable into and out of engagement with the first set, means for moving the first set of pinions normally timed to keep them disengaged from the racks during the latter's advance and engaged therewith during return of racks to normal, and a key for disabling said means whereby the said pinions remain in mesh with the racks during both advance and return thereof, said key operating to engage the second set of pinions with the first during the return of the racks.

29. In a machine of the character described, the combination of reciprocating racks, a set of accumulator pinions movable into and out of engagement therewith, a second set of accumulator pinions movable into and out of engagement with the first set, means for moving the first set of pinions normally timed to keep them disengaged from the racks during the latter's advance and engaged therewith during return of racks to normal, said means being adjustable to effect the reverse order of operation, and a key for so adjusting said means manipulative to wholly disable the same causing the pinions to remain in mesh with the racks during both advance and return thereof, said key when so manipulated operating to engage the second set of pinions with the first during the return of the racks.

30. In a machine of the character described, the combination of reciprocating racks, a rock frame, a set of pinions in the latter adapted to be engaged with and disengaged from said racks by the rocking of said frame, a second rock frame concentric with the latter, a set of pinions in said second rock frame adapted to be engaged with and disengaged from the first set of pinions by the rocking of said second frame, means for rocking the first mentioned frame normally timed to keep the pinions thereof disengaged from the racks during the latter's advance and engaged therewith during their return to normal, a depressible spring-held key for disabling said means and thereby causing said pinions to remain engaged with the racks during advance of the latter, the release and restoration of said key at an intermediate stage in the operation of the machine causing said pinions to still remain engaged with the racks during the return of the latter to normal, and a catch or hook carried by said key and adapted to engage the second rock frame and draw its pinions into mesh with the first set of pinions when the said key is so released.

31. In a machine of the character de-

scribed, the combination of reciprocating racks, a rock frame, a set of pinions in the latter adapted to be engaged with and disengaged from said racks by the rocking of  
 5 said frame, a second rock frame concentric with the latter, a set of pinions in said second rock frame adapted to be engaged with and disengaged from the first set of pinions by the rocking of said second frame, means for  
 10 rocking the first mentioned frame normally timed to keep the pinions thereof disengaged from the racks during the latter's advance and engaged therewith during their return to normal, a depressible spring-held key for  
 15 disabling said means and thereby causing said pinions to remain engaged with the racks during advance of the latter, the release and restoration of said key at an intermediate stage in the operation of the machine causing said pinions to still remain en-  
 20 gaged with the racks during the return of the latter to normal, a catch or hook carried by said key and adapted to engage the second rock frame and draw its pinions into  
 25 mesh with the first set of pinions when the said key is so released, and means for displacing said catch or hook in an ensuing operation of the machine.

32. In a machine of the character de-  
 30 scribed, the combination of reciprocating racks, a rock frame, a set of pinions in the latter adapted to be engaged with and disengaged from said racks by the rocking of said frame, a second rock frame concentric  
 35 with the latter, a set of pinions in said second rock frame adapted to be engaged with and disengaged from the first set of pinions by the rocking of said second frame, means for rocking the first mentioned frame normally  
 40 timed to keep the pinions thereof disengaged from the racks during the latter's advance and engaged therewith during their return to normal, a depressible spring-held key for disabling said means and thereby causing  
 45 said pinions to remain engaged with the racks during advance of the latter, the release and restoration of said key at an intermediate stage in the operation of the machine causing said pinions to still remain en-  
 50 gaged with the racks during the return of the latter to normal, a spring-drawn catch or hook pivoted to said key and adapted when the latter is depressed to engage under a portion of the second rock frame and when the key rises to lift said frame and engage its  
 55 pinions with those of the first rock frame, and an oscillatory arm having a cam-slot embracing a projection on said catch or hook, said arm being oscillated through connection  
 60 with the means for rocking the first mentioned frame whereby in a regular or itemizing operation of the machine following an operation during which said key was depressed, the said hook will be disengaged from the  
 65 second rock frame.

33. In a machine of the character de-  
 scribed, the combination of reciprocating racks, a rock frame, a set of pinions in the latter adapted to be engaged with and dis-  
 engaged from said racks by the rocking of  
 70 said frame, a second rock frame concentric with the latter, a set of pinions in said second rock frame adapted to be engaged with and disengaged from the first set of pinions by the rocking of said second frame, means  
 75 for rocking the first mentioned frame normally timed to keep the pinions thereof disengaged from the racks during the latter's advance and engaged therewith during their return to normal, a depressible spring-held  
 80 key for disabling said means and thereby causing said pinions to remain engaged with the racks during advance of the latter, the release and restoration of said key at an intermediate stage in the operation of the ma-  
 85 chine causing said pinions to still remain engaged with the racks during the return of the latter to normal, a spring-drawn catch or hook pivoted to said key and adapted when the latter is depressed to engage  
 90 under a portion of the second rock frame and when the key rises to lift said frame and engage its pinions with those of the first rock frame, an oscillatory arm having a cam-slot embracing a projection on said catch or hook,  
 95 said arm being oscillated through connection with the means for rocking the first mentioned frame whereby in a regular or itemizing operation of the machine following an operation during which said key was de-  
 100 pressed, the said hook will be disengaged from the second rock frame, and means for disabling the connection between said arm and said frame-rocking means by depression of said key.  
 105

34. In a machine of the character de-  
 scribed, the combination of reciprocating racks, a rock frame, a set of pinions in the latter adapted to be engaged with and dis-  
 engaged from said racks by the rocking of  
 110 said frame, a second rock frame concentric with the latter, a set of pinions in said second rock frame adapted to be engaged with and disengaged from the first set of pinions by the rocking of said second frame, means for  
 115 rocking the first mentioned frame normally timed to keep the pinions thereof disengaged from the racks during the latter's advance and engaged therewith during their return to normal, said means including a vibratory  
 120 wipe plate or pawl, a depressible spring-held key for disabling said means and thereby causing said pinions to remain engaged with the racks during advance of the latter, the release and restoration of said key at an in-  
 125 termediate stage in the operation of the machine causing said pinions to still remain engaged with the racks during the return of the latter to normal, a spring-drawn catch or hook pivoted to said key and adapted when  
 130

the latter is depressed to engage under a portion of the second rock frame and when the key rises to lift said frame and engage its pinions with those of the first rock frame, an oscillatory arm having a cam-slot embracing a projection on said catch or hook, said arm being acted upon by the aforesaid wipe-pawl in an itemizing operation of the machine, and an arm carried by said key and adapted to displace the wipe-pawl when the key is depressed.

35. In a machine of the character described, the combination of reciprocating racks, a rock frame, a set of pinions in the latter adapted to be engaged with and disengaged from said racks by the rocking of said frame, a second rock frame concentric with the latter, a set of pinions in said second rock frame adapted to be engaged with and disengaged from the first set of pinions by the rocking of said second frame, means for rocking the first mentioned frame with provisions for timing the movements so the racks may operate to successively accumulate amounts on the pinions in said frame or return said pinions to zero and then immediately restore the accumulation therein, means for rocking the second frame to bring its pinions into mesh with those of the first rock frame for receiving the same accumulation as restored on the latter's pinions, and a key for rocking said second frame to draw its pinions into mesh with the pinions of the first rock frame at the outset of an operation of the machine, said key adjusting the rocking means for the first frame so as to keep the latter pinions in mesh with racks during the latter's advance, with provisions for disengaging the second set of pinions and leaving the same at zero.

36. In a machine of the character described, the combination of reciprocating racks, a rock frame, a set of pinions in the latter adapted to be engaged with and disengaged from said racks by the rocking of said frame, a second rock frame concentric with the latter, a set of pinions in said second rock frame adapted to be engaged with and disengaged from the first set of pinions by the rocking of said second frame, means for rocking the first mentioned frame with provisions for timing the movements so the racks may operate to successively accumulate amounts on the pinions in said frame or return said pinions to zero and then immediately restore the accumulation therein, means for rocking the second frame to bring its pinions into mesh with those of the first rock frame for receiving the same accumulation as restored on the latter's pinions, a key for rocking said second frame to draw its pinions into mesh with the pinions of the first rock frame at the outset of an operation of the machine, said key adjusting the rocking means for the first frame so as to keep the latter pinions in mesh with racks during

the latter's advance, means for holding said key in operated position until the end of the complete operation of the machine; and means for disengaging the second set of pinions when at zero.

37. In a machine of the character described, the combination of reciprocating racks, a rock frame, a set of pinions in the latter adapted to be engaged with and disengaged from said racks by the rocking of said frame, a second rock frame concentric with the latter, a set of pinions in said second rock frame adapted to be engaged with and disengaged from the first set of pinions by the rocking of said second frame, means for rocking the first mentioned frame with provisions for timing the movements so the racks may operate to successively accumulate amounts on the pinions in said frame or return said pinions to zero and then immediately restore the accumulation therein, means for rocking the second frame to bring its pinions into mesh with those of the first rock frame for receiving the same accumulation as restored on the latter's pinions, a depressible spring-held key for rocking said second frame to draw its pinions into mesh with the pinions of the first rock frame at the outset of an operation of the machine; said key adjusting the rocking means for the first frame so as to keep the latter pinions in mesh with the racks during the latter's advance, a latch for holding said key depressed; means for displacing the latch at the conclusion of a complete operation of the machine; and means for disengaging the second set of pinions at an intermediate stage when the same stand at zero.

38. In a machine of the character described, the combination of reciprocating racks, a rock frame, a set of pinions in the latter adapted to be engaged with and disengaged from said racks by the rocking of said frame, a second rock frame concentric with the latter, a set of pinions in said second rock frame adapted to be engaged with and disengaged from the first set of pinions by the rocking of said second frame, means for rocking the first mentioned frame with provisions for timing the movements so the racks may operate to successively accumulate amounts on the pinions in said frame or return said pinions to zero and then immediately restore the accumulation therein, means for rocking the second frame to bring its pinions into mesh with those of the first rock frame for receiving the same accumulation as restored on the latter's pinions, a depressible spring-held key for adjusting the rocking means so as to keep the pinions of the first-mentioned rock-frame in mesh with the racks during the latter's advance, a catch or hook operated by said key to draw the pinions of the second rock-frame into mesh with the pinions of the first rock-frame at the outset

of an operation of the machine, means for latching down the said key throughout an operation of the machine, and means for disabling the latching means at an intermediate stage when the pinions of the second rock frame are at zero.

39. In a machine of the character described, the combination of reciprocating racks, a set of accumulator pinions movable into and out of engagement therewith, a second set of accumulator pinions movable into and out of engagement with the first set, means for moving the first set of pinions normally timed to keep them disengaged from the racks during the latter's advance and engaged therewith during return of racks to normal, a key for disabling said means whereby the said pinions remain in mesh with the racks during both advance and return thereof, said key operating to engage the second set of pinions with the first during the return of the racks, and a second key arranged to operate the first-mentioned key and to rock the second frame bringing its pinions to mesh with those of the first rock frame.

40. In a machine of the character described, the combination of reciprocating racks, a set of accumulator pinions movable into and out of engagement therewith, a second set of accumulator pinions movable into and out of engagement with the first set, means for moving the first set of pinions normally timed to keep them disengaged from the racks during the latter's advance and engaged therewith during return of racks to normal, a key for disabling said means whereby the said pinions remain in mesh with the racks during both advance and return thereof, said key operating to engage the second set of pinions with the first during the return of the racks, a second key arranged to operate the first-mentioned key and to rock the second frame bringing its pinions to mesh with those of the first rock frame, and means for holding said second key in operative position throughout an operation of the machine.

41. In a machine of the character described, the combination of reciprocating racks, a set of accumulator pinions movable into and out of engagement therewith, a second set of accumulator pinions movable into and out of engagement with the first set, means for moving the first set of pinions normally timed to keep them disengaged from the racks during the latter's advance and engaged therewith during return of racks to normal, said means being adjustable to effect the reverse order of operation, a key for so adjusting said means manipulative to wholly disable the same causing the pinions to remain in mesh with the racks during both advance and return thereof, said key when so manipulated operating to engage the second

set of pinions with the first during the return of the racks, and a second key arranged to operate the first-mentioned key and to rock the second frame bringing its pinions to mesh with those of the first rock frame.

42. In a machine of the character described, the combination of reciprocating racks, a set of accumulator pinions movable into and out of engagement therewith, a second set of accumulator pinions movable into and out of engagement with the first set, means for moving the first set of pinions normally timed to keep them disengaged from the racks during the latter's advance and engaged therewith during return of racks to normal, said means being adjustable to effect the reverse order of operation, a key for so adjusting said means manipulative to wholly disable the same, causing the pinions to remain in mesh with the racks during both advance and return thereof, said key when so manipulated operating to engage the second set of pinions with the first during the return of the racks, a second key arranged to operate the first-mentioned key and to rock the second frame bringing its pinions to mesh with those of the first rock frame, and means for holding said second key in operated position throughout an operation of the machine.

43. In a machine of the character described, the combination of reciprocating racks, a rock frame, a set of pinions in the latter adapted to be engaged with and disengaged from said racks by the rocking of said frame, a second rock frame concentric with the latter, a set of pinions in said second rock frame adapted to be engaged with and disengaged from the first set of pinions by the rocking of said second frame, means for rocking the first mentioned frame normally timed to keep the pinions thereof disengaged from the racks during the latter's advance and engaged therewith during their return to normal, a depressible spring-held key for disabling said means and thereby causing said pinions to remain engaged with the racks during the advance of the latter, the release and restoration of said key at an intermediate stage in the operation of the machine causing said pinions to still remain engaged with the racks during the return of the latter to normal, a catch or hook carried by said key and adapted to engage the second rock frame and draw its pinions into mesh with the first set of pinions when the said key is so released, a second depressible key arranged to depress said first-mentioned key, and a catch or hook operated by said second key and engaging a portion of the second rock-frame whereby the latter is caused to carry its pinions into mesh with the pinions of the first rock-frame at the outset of an operation of the machine.

44. In a machine of the character described, the combination of reciprocating racks, a rock frame, a set of pinions in the

latter adapted to be engaged with and disengaged from said racks by the rocking of said frame, a second rock frame concentric with the latter, a set of pinions in said second rock frame adapted to be engaged with and disengaged from the first set of pinions by the rocking of said second frame, means for rocking the first mentioned frame normally timed to keep the pinions thereof disengaged from the racks during the latter's advance and engaged therewith during their return to normal, a depressible spring-held key for disabling said means and thereby causing said pinions to remain engaged with the racks during advance of the latter, the release and restoration of said key at an intermediate stage in the operation of the machine causing said pinions to still remain engaged with the racks during the return of the latter to normal, a catch or hook carried by said key and adapted to engage the second rock frame and draw its pinions into mesh with the first set of pinions when the said key is so released, a second depressible key arranged to depress said first-mentioned key, and a catch or hook operated by said second key and engaging a portion of the second rock-frame whereby the latter is caused to carry its pinions into mesh with the pinions of the first rock-frame at the outset of an operation of the machine, the depression of said second key effecting displacement of the catch or hook carried by the first key.

45. In a machine of the character described, the combination of reciprocating racks, a rock frame, a set of pinions in the latter adapted to be engaged with and disengaged from said racks by the rocking of said frame, a second rock frame concentric with the latter, a set of pinions in said second rock frame adapted to be engaged with and disengaged from the first set of pinions by the rocking of said second frame, means for rocking the first mentioned frame normally timed to keep the pinions thereof disengaged from the racks during the latter's advance and engaged therewith during their return to normal, a depressible spring-held key for disabling said means and thereby causing said pinions to remain engaged with the racks during advance of the latter, the release and restoration of said key at an intermediate stage in the operation of the machine causing said pinions to still remain engaged with the racks during the return of the latter to normal, a catch or hook carried by said key and adapted to engage the second rock frame and draw its pinions into mesh with the first set of pinions when the said key is so released, means for displacing said catch or hook in an ensuing operation of the machine, a second depressible key arranged to depress said first-mentioned key, and a catch or hook operated by said second key and engaging a portion of the second rock-frame whereby

the latter is caused to carry its pinions into mesh with the pinions of the first rock-frame at the outset of an operation of the machine.

46. In a machine of the character described, the combination of reciprocating racks, a rock frame, a set of pinions in the latter adapted to be engaged with and disengaged from said racks by the rocking of said frame, a second rock frame concentric with the latter, a set of pinions in said second rock frame adapted to be engaged with and disengaged from the first set of pinions by the rocking of said second frame, means for rocking the first-mentioned frame normally timed to keep the pinions thereof disengaged from the racks during the latter's advance and engaged therewith during their return to normal, a depressible spring-held key for disabling said means and thereby causing said pinions to remain engaged with the racks during advance of the latter, the release and restoration of said key at an intermediate stage in the operation of the machine causing said pinions to still remain engaged with the racks during the return of the latter to normal, a catch or hook carried by said key and adapted to engage the second rock frame and draw its pinions into mesh with the first set of pinions when the said key is so released, means for displacing said catch or hook in an ensuing operation of the machine, a second depressible key arranged to depress said first-mentioned key, and a catch or hook operated by said second key and engaging a portion of the second rock-frame whereby the latter is caused to carry its pinions into mesh with the pinions of the first rock-frame at the outset of an operation of the machine, the depression of said second key effecting displacement of the catch or hook carried by the first key.

47. In a machine of the character described, the combination of reciprocating racks, a rock frame, a set of pinions in the latter adapted to be engaged with and disengaged from said racks by the rocking of said frame, a second rock frame concentric with the latter, a set of pinions in said second rock frame adapted to be engaged with and disengaged from the first set of pinions by the rocking of said second frame, means for rocking the first mentioned frame normally timed to keep the pinions thereof disengaged from the racks during the latter's advance and engaged therewith during their return to normal, a depressible spring-held key for disabling said means and thereby causing said pinions to remain engaged with the racks during advance of the latter, the release and restoration of said key at an intermediate stage in the operation of the machine causing said pinions to still remain engaged with the racks during the return of the latter to normal, a spring-drawn catch or hook pivoted to said key and adapted when the latter is de-

pressed to engage under a portion of the second rock frame and when the key rises to lift said frame and engage its pinions with those of the first rock frame, an oscillatory arm having a cam-slot embracing a projection on said catch or hook, said arm being oscillated through connection with the means for rocking the first mentioned frame whereby in a regular or itemizing operation of the machine following an operation during which said key was depressed, the said hook will be disengaged from the second rock frame, means for disabling the connection between said arm and said frame-rocking means by depression of said key, a second depressible key arranged to depress said first-mentioned key, and a catch or hook operated by said second key and engaging a portion of the second rock-frame whereby the latter is caused to carry its pinions into mesh with the pinions of the first rock frame at the outset of an operation of the machine, the depression of said second key effecting displacement of the catch or hook carried by the first key.

48. In a machine of the character described, the combination of reciprocating racks, a rock frame, a set of pinions in the latter adapted to be engaged with and disengaged from said racks by the rocking of said frame, a second rock frame concentric with the latter, a set of pinions in said second rock frame adapted to be engaged with and disengaged from the first set of pinions by the rocking of said second frame, means for rocking the first mentioned frame normally timed to keep the pinions thereof disengaged from the racks during the latter's advance and engaged therewith during their return to normal, a depressible spring-held key for disabling said means and thereby causing said pinions to remain engaged with the racks during advance of the latter, the release and restoration of said key at an intermediate stage in the operation of the machine causing said pinions to still remain engaged with the racks during the return of the latter to normal, a catch or hook carried by said key and adapted to engage the second rock frame and draw its pinions into mesh with the first set of pinions when the said key is so released, a second depressible key arranged to depress said first-mentioned key, a catch or hook operated by said second key and engaging a portion of the second rock-frame whereby the latter is caused to carry its pinions into mesh with the pinions of the first rock-frame at the outset of an operation of the machine, means for latching down said second key throughout an operation of the machine, and means for displacing the catch or hook at an intermediate stage when the pinions of the second rock-frame are at zero.

49. In a machine of the character described, the combination of reciprocating racks, a rock frame, a set of pinions in the

latter adapted to be engaged with and disengaged from said racks by the rocking of said frame, a second rock frame concentric with the latter, a set of pinions in said second rock frame adapted to be engaged with and disengaged from the first set of pinions by the rocking of said second frame, means for rocking the first mentioned frame normally timed to keep the pinions thereof disengaged from the racks during the latter's advance and engaged therewith during their return to normal, a depressible spring-held key for disabling said means and thereby causing said pinions to remain engaged with the racks during advance of the latter, the release and restoration of said key at an intermediate stage in the operation of the machine causing said pinions to still remain engaged with the racks during the return of the latter to normal, a catch or hook carried by said key and adapted to engage the second rock frame and draw its pinions into mesh with the first set of pinions when the said key is so released, a second depressible key arranged to depress said first-mentioned key, a catch or hook operated by said second key and engaging a portion of the second rock-frame whereby the latter is caused to carry its pinions into mesh with the pinions of the first rock-frame at the outset of an operation of the machine, means for latching down said second key throughout an operation of the machine, and means for displacing its catch or hook at an intermediate stage when the pinions of the second rock-frame are at zero, the depression of said second key effecting displacement of the catch or hook carried by the first key.

50. In a machine of the character described, the combination of actuating racks, printing type controlled thereby, means for taking impressions from said type, accumulator pinions movable into and out of engagement with said racks, means for so moving the pinions adjustable to reverse the order of their engagement with and disengagement from the racks, and means for effecting such adjustment with provisions for disabling the impression means.

51. In a machine of the character described, the combination with actuating racks, printing type controlled thereby and means for taking impressions from said type, of a set of accumulator pinions movable into and out of engagement with said racks, a second set of accumulator wheels movable into and out of engagement with the first set, and means for varying the order of engagement and disengagement between the racks and the first set of pinions and the latter and the second set of pinions whereby successive items or amounts can be accumulated by the first set of pinions and the accumulation transferred to the second set of pinions and the first set of pinions then

turned to zero, with provisions for preventing the taking of an impression from type set up in such turning of the first set of pinions to zero.

5 52. In a machine of the character described, the combination with actuating racks, printing type controlled thereby and means for taking impressions from said type, of a set of accumulator pinions movable into  
10 and out of engagement with said racks, a second set of accumulator wheels movable into and out of engagement with the first set, and means for varying the order of engagement and disengagement between the racks and the first set of pinions and the latter and the second set of pinions whereby  
15 successive items or amounts can be accumulated by the first set of pinions, the latter turned to and left at zero by the racks or turned to zero and the accumulation immediately restored and duplicated in the second set of pinions and the first set of pinions then turned to zero, with provisions for preventing the taking of an impression  
20 from type set up in such turning to zero of the first set of pinions.

53. In a machine of the character described, the combination with the actuating racks, printing type controlled thereby and means for taking impressions from said type, of a set of accumulator pinions movable into  
30 and out of engagement with said racks, a second set of accumulator wheels movable into and out of engagement with the first set, means for varying the order of engagement and disengagement between the racks and the first set of pinions and the latter and the second set of pinions whereby successive items or amounts can be accumulated by the first  
35 set of pinions and the accumulation transferred to the second set of pinions; and whereby the first set of pinions can be turned to zero, and a key for adjusting said means to turn the first set of pinions to zero and disable the impression means.

54. In a machine of the character described, the combination of actuating racks, printing type controlled thereby, hammers for making impressions from said type, a bail  
50 or frame for retracting said hammers, latches for restraining the same when said bail advances, means for tripping said latches at an advanced stage in an operation of the machine, accumulator pinions movable into and  
55 out of engagement with the racks, means for controlling said pinions adjustable to reverse the order of their engagement with and disengagement from the racks whereby repeated accumulations of amounts can be had or the turning to zero of said pinions, and means  
60 whereby as an incident to adjustment of said accumulator controlling means for turning to zero, the hammer latches are displaced thereby preventing printing by permitting the hammers to follow the aforesaid bail.

55. In a machine of the character described, the combination of actuating racks, printing type controlled thereby, hammers for making impressions from said type, a bail  
70 or frame for retracting said hammers, latches for restraining the same when said bail advances, means for tripping said latches at an advanced stage in an operation of the machine, accumulator pinions movable into and  
75 out of engagement with the racks, means for controlling said pinions adjustable to reverse the order of their engagement with and disengagement from the racks whereby repeated accumulations of amounts can be had or the turning to zero of said pinions, and a key  
80 which effects the latter adjustment and the displacement of the hammer latches, to prevent printing by permitting the hammers to follow the aforesaid bail.

56. In a machine of the character described, the combination of actuating racks, printing type controlled thereby, hammers for making impressions from said type, a bail  
85 or frame for retracting said hammers, latches for restraining the same when said bail advances, means for tripping said latches at an advanced stage in an operation of the machine, accumulator pinions movable into and  
90 out of engagement with the racks, means for controlling said pinions adjustable to reverse the order of their engagement with and disengagement from the racks whereby repeated accumulations of amounts can be had or the turning to zero of said pinions, a key which  
95 effects the latter adjustment, a catch bar for displacing the hammer latches having an irregular slot, a vibratory arm supporting said bar, means for vibrating said arm, and a rock arm controlled by said key and having a stud  
100 engaging said irregular slot and normally preventing engagement of the catch bar with the hammer latches but when shifted by said key permitting such engagement to take place; substantially as and for the purpose described.

57. In a machine of the character described, the combination with actuating racks, printing type controlled thereby and means for taking impressions from said type, of a set of accumulator pinions movable into  
110 and out of engagement with said racks, a second set of accumulator pinions movable into and out of engagement with the first set, means for varying the order of engagement and disengagement between the racks and the first set of pinions and the latter and the second set of pinions whereby successive items or amounts can be accumulated by the first set of pinions and the accumulation transferred to the second set of pinions, and  
115 whereby the first set of pinions can be turned to zero, a key for adjusting said means to turn the first set of pinions to zero and disable the impression means, and means for latching said key in operated position.

58. In a machine of the character de- 130

scribed, the combination with actuating racks, printing type controlled thereby and means for taking impressions from said type, of a set of accumulator pinions movable into and out of engagement with said racks, a second set of accumulator wheels movable into and out of engagement with the first set, means for varying the order of engagement and disengagement between the racks and the first set of pinions and the latter and the second set of pinions whereby successive items or amounts can be accumulated by the first set of pinions and the accumulation transferred to the second set of pinions, and whereby the first set of pinions can be turned to zero, a key for adjusting said means to turn the first set of pinions to zero and disable the impression means, means for latching said key in operated position, and means for releasing the key at the conclusion of an operation of the machine.

59. In a machine of the character described, the combination of reciprocating racks, a set of pinions movable into and out of engagement therewith, means for controlling said pinions normally timed to keep them out of engagement during the advance of the racks and in engagement with the latter during their return but adjustable to reverse this order when the pinions are to turn to zero, a second set of pinions movable into and out of engagement with the first mentioned set, a depressible key which adjusts the controlling means for the turning to zero of the first-mentioned set of pinions and which is manipulative to cause said pinions to still remain in mesh with the racks during the return movement of the latter, devices operated by said key under such manipulation to engage the second set of pinions with the first set, printing type controlled by the racks and adapted to set up amounts as accumulated or totals as the pinions are turned to zero, impression means for said type, and a second depressible key adapted to depress the first-mentioned key for effecting an adjustment of the controlling means for turning the first set of pinions to zero, said second key disabling the impression means.

60. In a machine of the character described, the combination of reciprocating racks, a set of pinions movable into and out of engagement therewith, means for controlling said pinions normally timed to keep them out of engagement during the advance of the racks and in engagement with the latter during their return but adjustable to reverse this order when the pinions are to turn to zero, a second set of pinions movable into and out of engagement with the first-mentioned set, a depressible key which adjusts the controlling means for the turning to zero of the first-mentioned set of pinions and which is manipulative to cause said pinions to still remain in mesh with the racks

during the return movement of the latter, devices operated by said key under such manipulation to engage the second set of pinions with the first set, a second depressible key adapted to depress the first-mentioned key and engage the second set of pinions with the first set, printing type controlled by the racks and adapted to set up amounts as accumulated and totals as the pinions are turned to zero, impression means for said type, and a third depressible key adapted to depress the first-mentioned key and disable the impression means.

61. In a machine of the character described, the combination of reciprocating racks, a set of pinions movable into and out of engagement therewith, means for controlling said pinions normally timed to keep them out of engagement during the advance of the racks and in engagement with the latter during their return but adjustable to reverse this order when the pinions are to turn to zero, a second set of pinions movable into and out of engagement with the first-mentioned set, a depressible key which adjusts the controlling means for the turning to zero of the first-mentioned set of pinions and which is manipulative to cause said pinions to still remain in mesh with the racks during the return movement of the latter, devices operated by said key under such manipulation to engage the second set of pinions with the first set, a second depressible key adapted to depress the first-mentioned key and engage the second set of pinions with the first set, printing type controlled by the racks and adapted to set up amounts as accumulated and totals as the pinions are turned to zero, impression means for said type, a third depressible key adapted to depress the first-mentioned key and disable the impression means, and means for latching down the second and third-mentioned keys.

62. In a machine of the character described, the combination of reciprocating racks, a set of pinions movable into and out of engagement therewith, means for controlling said pinions normally timed to keep them out of engagement during the advance of the racks and in engagement with the latter during their return but adjustable to reverse this order when the pinions are to turn to zero, a second set of pinions movable into and out of engagement with the first-mentioned set, a depressible key which adjusts the controlling means for the turning to zero of the first-mentioned set of pinions and which is manipulative to cause said pinions to still remain in mesh with the racks during the return movement of the latter, devices operated by said key under such manipulation to engage the second set of pinions with the first set, a second depressible key adapted to depress the first-mentioned key and engage the second set of pinions with the first

set, printing type controlled by the racks and adapted to set up amounts as accumulated and totals as the pinions are turned to zero, impression means for said type, a third depressible key adapted to depress the first-mentioned key and disable the impression means, latches for the second and third-mentioned keys, and means for displacing either latch as the machine completes a cycle of operation.

63. In a machine of the character described, the combination of actuating racks, accumulator pinions meshing therewith, a second set of accumulator pinions meshing with the first set, transfer trips displaced by the latter, and transfer trips displaced by the other set of pinions and displacing the first mentioned transfer trips.

64. In a machine of the character described, the combination of reciprocating carriers, racks thereon spring-drawn for limited independent movement, swinging pawls normally restraining said racks, accumulator pinions meshing with the racks and having projections to displace said pawls, a second set of accumulator pinions meshing with the first set and having transfer projections, and trips operated thereby and operating to displace the swinging pawls.

65. In a machine of the character described the combination of reciprocating carriers, racks thereon spring-drawn for limited independent movement, swinging pawls normally restraining said racks, accumulator pinions meshing with the racks and having projections to displace said pawls, a second set of accumulator pinions meshing with the first set and having transfer projections, and spring-drawn trip-levers operated thereby and operating to displace the swinging pawls.

66. In a machine of the character described, the combination of actuating racks, a set of accumulator pinions engageable therewith and disengageable therefrom, means for controlling said pinions to advance them by the racks in accumulating items or return them to zero and then advance them to restore an accumulation, transfer devices for said set of accumulators, a second set of accumulator pinions movable into and out of engagement with the first set for receiving the restored accumulation thereof or itself being turned to zero, transfer devices for said second set of accumulator pinions, and means for disabling the transfer devices of the first set of accumulator pinions when the second set is turned to zero.

67. In a machine of the character described the combination of reciprocating carriers, racks thereon spring-drawn for limited independent movement, swinging pawls normally restraining said racks, a set of accumulator pinions engageable with and disengageable from the racks and having projections to displace said pawls, means for controlling

said pinions to advance them by the racks in accumulating items or return them to zero and then advance them to restore an accumulation, a second set of accumulator pinions movable into and out of engagement with the first set for receiving the restored accumulation thereof or itself being turned to zero, said pinions having transfer projections, trips operated thereby to displace the swinging pawls, and means for displacing the latter when the second set of pinions is turned to zero.

68. In a machine of the character described, the combination of reciprocating carriers, racks thereon spring-drawn for limited independent movement, swinging pawls normally restraining said racks, a set of accumulator pinions engageable with and disengageable from the racks and having projections to displace said pawls, means for controlling said pinions to advance them by the racks in accumulating items or return them to zero and then advance them to restore an accumulation, a second set of accumulator pinions movable into and out of engagement with the first set for receiving the restored accumulation thereof or itself being turned to zero, said pinions having transfer projections, trips operated thereby to displace the swinging pawls, a key for moving the second set of pinions into engagement with the first set of pinions, and a set of arms operated by said key to displace the said pawls and themselves restrain the racks.

69. In a machine of the character described the combination of reciprocating carriers, racks thereon spring-drawn for limited independent movement, swinging pawls normally restraining said racks, a set of accumulator pinions engageable with and disengageable from the racks and having projections to displace said pawls, means for controlling said pinions to advance them by the racks in accumulating items or return them to zero and then advance them to restore an accumulation, a second set of accumulator pinions movable into and out of engagement with the first set for receiving the restored accumulation thereof or itself being turned to zero, said pinions having transfer projections, trips operated thereby to displace the swinging pawls, a key for moving the second set of pinions into engagement with the first set of pinions, and keeping the latter engaged with the racks during movement of the latter in both directions, a set of arms operated by said key to displace the said pawls and themselves restrain the racks, and means controlled by said key to disengage the second set of pinions from the first at the conclusion of the initial excursion of the racks.

WILLIAM E. SWALM.

Witnesses:

GEORGE T. HACKLEY,  
FRANK L. A. GRAHAM.

It is hereby certified that in Letters Patent No. 885,202, granted April 21, 1908, upon the application of William E. Swalm, of Los Angeles, California, for an improvement in "Adding and Listing Machines," errors appear in the printed specification requiring correction, as follows: In line 70, page 3, the reference numeral "916" should read 926, and in line 95, page 11, the words "set of pinions in said" should be stricken out; and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 19th day of May, A. D., 1908.

[SEAL.]

C. C. BILLINGS,  
*Acting Commissioner of Patents.*