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PATENT SPECIFICATION



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413,373

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Complete Accepted: July 19, 1934.

PROVISIONAL SPECIFICATION.

Improvements in or relating to Calculating or Adding Machines.

We, PETERS LIMITED, a British Company, of Westland Works, Yeovil, in the County of Somerset, and GUY BAZELEY PETER, of Westland Works, aforesaid, a subject of the King of Great Britain, do hereby declare the nature of this invention to be as follows:—

This invention relates to key-driven calculating or adding machines and has more particular reference to the zeroizing or cancelling mechanism employed in such machines.

In some machines during the zeroizing or cancelling operation the numeral wheels in each of the columns of the machine are rotated to predetermined positions by the manipulation of a zeroizing handle. The several wheels become locked as soon as the predetermined position is reached and a spring drive is provided so that in those columns where the said position is reached before the handle movement is completed, further movement of the handle merely has the effect of extending the driving springs with the result that upon the return movement of the handle the springs so extended cause the handle to return with considerable force or shock, which sometimes interferes with a transfer operation which is effected throughout the numeral wheels during the return movement of the handle so as to cause all of the wheels to be moved to the zero position. In some other machines during key actuation of the machine, springs are tensioned as the numeral wheels move from the "0" to the "9" position and during movement of the wheels between the "9" to the "0" position these springs are discharged and their force used to actuate the transfer pawls in the adjacent columns of higher order to effect a transfer or carry. In these machines during the zeroizing operation non-return pawls which hold the pinions are lifted and the pinions allowed to move backwards to the "0" positions under the action of their associated springs. The transfer springs are therefore employed during the zeroizing operation but there is no transfer movement involved. Both of these methods of zeroizing are not altogether

satisfactory and according to the present invention the zeroizing or cancelling of the numeral wheels is effected by rotating the numeral wheels positively in a forward direction to the zero positions, that is to say, in the same direction in which they are moved during key actuation, so as to effect the zeroizing operation without the necessity of utilizing the transfer mechanism and without utilizing the springs that are tensioned during key actuation. The zeroizing mechanism according to the invention preferably comprises a pivoted toothed segment in each column of the machine, the said toothed segment co-operating with a toothed cam so that upon actuation of the toothed segment all of the numeral wheels which at the time of the zeroizing operation are in a position other than the zero position are moved forward, that is in their usual direction of additive rotation to the said zero position. The arrangement is preferably such that if for example an incomplete action of the zeroizing handle occurs so that one or more of the numeral wheels are not returned to the zero position all of the keys of the machine in the several columns are locked so as to prevent key actuation of the machine until by a further movement of the zeroizing handle the zeroizing operation is completed. Means are also preferably employed for rendering the transfer mechanism inoperative during the zeroizing operation so as to prevent the possibility when rotating one of the numeral wheels of transferring a carry to the next column of higher order thus moving the reading in the latter column from the "0" to "1" position. Actuation of the toothed segments to effect the zeroizing operation is preferably accomplished simultaneously in all of the columns by the provision of a transverse rail or bar that is moved upon movement being imparted to the zeroizing handle, the said transverse rail being connected to the toothed segments preferably through the medium of springs. The said transverse rail or bar may be connected to another transverse rail or bar which operates in conjunction with the means for

rendering the transfer mechanism inoperative during the zeroizing operation.

In one form of the invention as applied to a calculating or adding machine having numeral wheels coupled to pinions adapted to be operated from the keyboard through the medium of toothed segments engaging the pinions, segment levers and the like, each pinion may be connected to a toothed cam or star wheel co-operating with another toothed segment as distinct from the one aforesaid which co-operates with the key actuated mechanism, and adapted to be moved into engagement with the toothed cam to rotate the pinions so as to move the numeral wheels forward to the zero position during the zeroizing operation. The pinions are associated with spring pressed pawls which permit rotation for example in a clockwise direction and prevent rotation for example in an anti-clockwise direction. The said toothed cams and the toothed segments are so shaped that if for example the numeral wheels are already in the zero position the segments move idly past the said cam but should the numeral wheels be in some intermediate positions the toothed segments rotate the wheels to the zero position after which further movement of the said toothed segments is idle. Each toothed cam may in one example be provided with three teeth the angle embraced between the points of the first and second tooth and the second and third tooth are 108° whilst the angle embraced between the points of the third and first tooth is 144° . Each toothed segment in this example is provided with three substantially square faced teeth the edges of which lie along the circumference of a circle which reaches to the roots of the cam teeth whereby the segment is enabled to turn the cam through nine-tenths of a revolution, that is to say, through three-tenths of a revolution for each tooth of the segment, which in the decimal system, would correspond with the turning of the numeral wheels through three places per tooth or nine places for the complete movement. If, however, the numeral wheel lies in the zero position the toothed cam presents the aforesaid 144° angle to the segment and the segment is able to pass down between the faces of two cam teeth without causing the cam to turn. Moreover, the cam cannot move so long as the segment is in a position between the two teeth disposed apart at 144° and therefore the numeral wheel remains in the zero position. If, for example, the numeral wheel is at a position other than zero the toothed segment upon being moved engages the teeth and rotates the said cam to the position in which the

numeral wheel stands at zero; further movement of the toothed segment thereafter is idle. When all of the numeral wheels are moved to the zero position the toothed segments can swing idly back into their inoperative positions wherein the lowermost teeth of the segments lie outside the path of the cams. The downward and upward movements of the toothed segments may be limited by the provision of stops and in one example a transverse rod may be provided passing through suitably disposed slots or apertures in the toothed segments. The toothed segments may be operated through the medium of a transverse rail or bar to which movement can be imparted upon turning a zeroizing handle about its pivot. The said transverse rail or bar is attached to all of the said toothed segments preferably through the medium of springs so as to provide a yielding connection to prevent damage to the parts should for example an accidental block occur in the mechanism as for instance if the operator should attempt to depress a key during the zeroizing operation. One edge of the said transverse rail or bar may contact with all of the said toothed segments and the said transverse rail may be associated with a spring that normally maintains the said rail and the toothed segments in their inoperative positions. It will be appreciated that if an incomplete movement of the zeroizing handle is made with the result that all of the numeral wheels are not moved to the zero position the toothed segments will be prevented from returning to their inoperative positions due to the aforesaid pinion to which the said cams are connected being prevented from rotating in an anti-clockwise direction by virtue of the associated spring pressed pawls. Consequently the said segments will remain in gear with the respective cams so that the pinions will be locked against both backward and forward movement and in such position key actuation would not be possible. In this position further movement must be imparted to the zeroizing handle to return all of the wheels to the zero position. The arrangement is therefore such that after an initial movement of the zeroizing handle the operation must be properly completed before further key actuation of the machine is possible.

In order to put the transfer mechanism which is provided in the machine out of action during the zeroizing operation means are provided for rendering the said transfer mechanism ineffective during such operation. These means may take a variety of forms. In the following description the means described is suitable for use in connection with transfer mech-

anism in which a snail cam is provided rotatable with a pinion and adapted to turn a transfer lever about its pivot which lever has a pawl adapted to be pressed into
 5 engagement with a pinion in the next higher column and to rotate this pinion at the appropriate time to effect the transfer operation. The said means is adapted to engage the said transfer pawl and the
 10 said transfer lever to move the said pawl out of engagement with the teeth of its associated pinion and to move the transfer lever out of the path of its associated snail cam. The said transfer lever and the said
 15 transfer pawl may be provided with arms which project into the path of a pivoted transverse rail adapted to be moved about its pivot to engage the said arms in all of the columns of the machine so that when
 20 the pivoted transverse rail is moved all of the transfer levers and the said transfer pawls are moved out of engagement with their respective cams and pinions thus rendering the transfer mechanism
 25 inoperative during the zeroizing operation. The said pivoted transverse rail may be moved through the medium of a link pivoted at one end of the rail and at its other end to an arm attached to the

aforesaid transverse rail which actuates 30 the aforesaid toothed segments.

It is to be understood that the invention is not to be limited to the above described details of construction since the mechanism is capable of variation. For example, the shape of the toothed cams or star wheels and the toothed segments may be varied and the number of teeth and the relationship thereof may be varied to meet particular conditions. The invention can be used in machines having any suitable type of transfer mechanism and the means for rendering the transfer mechanism inoperative will naturally be varied to suit the particular form of transfer mechanism used. 35 40 45

The invention can be applied to machines operating on the decimal system of notation; to machines operating on the English monetary system or to machines operating on any other system. 50

Dated this 20th day of January, 1933.

HASELTINE, LAKE & Co.,

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19—25, West 44th Street, New York, U.S.A.,

Agents for the Applicants.

COMPLETE SPECIFICATION.

Improvements in or relating to Calculating or Adding Machines.

We, PETTERS LIMITED, a British Company, of Westland Works, Yeovil, in the County of Somerset, and GUY BAZELEY
 55 PETER, of Westland Works, aforesaid, a subject of the King of Great Britain, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly
 60 described and ascertained in and by the following statement:—

This invention relates to key-driven calculating or adding machines and has more particular reference to the zeroizing or cancelling mechanism employed in such machines for returning the numeral wheels to zero position when desired.

In some machines such as those described in the Specification of Patent No. 360,377 during the zeroizing or cancelling operation the numeral wheels in each of the columns of the machine are rotated to predetermined positions by the manipulation of a zeroizing handle. The several
 75 wheels become locked as soon as the predetermined position is reached and a spring drive is provided so that in those columns where the said position is reached before the handle movement is completed,

further movement of the handle merely has the effect of extending the driving springs with the result that upon the return movement of the handle the springs so extended cause the handle to return with considerable force or shock that sometimes interferes with a transfer operation which is effected throughout the numeral wheels during the return movement of the handle so as to cause all of the wheels to be moved to the zero position. In some other machines during key actuation of the machine, transfer springs are tensioned as the numeral wheels move from the "0" to the "9" position and during movement of the wheels between the "9" to the "0" position these springs are discharged and their force used to actuate the transfer pawls in the adjacent columns of higher order to effect a transfer or carry. In these machines during the zeroizing operation non-return pawls which hold the pinions are lifted and the pinions allowed to move backwards to the "0" positions under the reaction of the aforesaid springs. The transfer springs are, therefore, employed during the zeroizing operation but there is no transfer movement involved. 80 85 90 95 100 105

Both of these methods of zeroizing are not altogether satisfactory and it is the chief object of the present invention to provide an improved zeroizing or cancelling mechanism in which the numeral wheels are rotated positively in the additive direction to the zero positions, that is to say, in the same direction in which they are moved during key actuation so as to effect the zeroizing operation without the necessity of utilizing transfer mechanism to aid the zeroizing operation and without lifting the non-return pawls and without utilizing the aforesaid springs that are tensioned during key actuation.

The zeroizing or cancelling mechanism according to the invention comprises a toothed segment or the like in each column or bank having a predetermined angular movement and adapted to engage, during the zeroizing operation a star wheel associated with each numeral wheel of the machine, the arrangement being such that the toothed segment is adapted to rotate the star wheel until the zero position is reached, the star wheel in this position being restrained from further movement by the toothed segment and until the latter is returned to its original position. With this construction the arrangement is such that if for example an incomplete action of the zeroizing handle occur so that one or more of the numeral wheels be not returned to the zero position all of the keys of the machine in the several columns are locked so as to prevent key actuation of the machine until by a further movement of the zeroizing handle the zeroizing operation is completed. Means are also preferably employed for rendering the transfer mechanism (which is provided for effecting a transfer or carry during key actuation) inoperative during the zeroizing operation so as to prevent the possibility when rotating one of the numeral wheels of transferring a carry to the next column higher order thus moving the reading in the latter column from the "0" to the "1" position. Actuation of the toothed segments to effect the zeroizing operation is preferably accomplished simultaneously in all of the columns by the provision of a transverse rail or bar that is moved upon movement being imparted to a zeroizing handle connected to the said rail or bar, the latter being connected to the toothed segments preferably through the medium of springs. The said transverse rail or bar may be connected to another transverse rail which operates the aforesaid means for rendering the transfer mechanism inoperative during the zeroizing operation.

The zeroizing mechanism according to the invention is especially intended for use with the calculating or adding machines described in Patent Specifications Nos. 360,375, 360,376 and 408,633. In these machines gear or actuating segments are employed for rotating pinions connected to the numeral wheels, the gear segments being normally out of mesh with the pinions, and it will be appreciated that when this mechanism is employed with the present invention, the toothed segments can be moved into mesh with the star wheels without first having to move the gear or actuating segments out of mesh with the pinions.

In order that the said invention may be clearly understood and readily carried into effect the same will now be more fully described with reference to the accompanying drawings in which:—

Figure 1 is a side elevation of the improved means for effecting the zeroizing or cancelling operation according to the invention, and

Figure 2 is a side view of one form of means employed in the invention for rendering the transfer mechanism inoperative during the zeroizing operation the star wheel and toothed segment shown in Figure 1 having been omitted for the sake of clarity.

The embodiment of the invention shown in the drawing is particularly suitable for use in conjunction with the calculating or adding machines described in the Specifications of our prior Patents Nos. 360,375 and 360,376, and in Specification No. 408,633, although it will be appreciated that the present invention can be applied to other types of calculating or adding machines. The calculating or adding machines described in the aforesaid specifications have numeral wheels coupled to pinions and adapted to be rotated from the keyboard through the medium of gear segments engaging the pinions, segment levers and the like, the gear segments being normally out of mesh with the pinions. In the accompanying drawings the reference numeral 3 indicates one of the pinions which is rotatable in the example shown in a clockwise direction with a numeral wheel not shown. The gear segment and segment lever for operating the pinion 3 from the keyboard are also not shown but may be of the type referred to in the aforesaid prior specifications. It will be understood that in a calculating or adding machine a pinion 3 and associated numeral wheel are provided in each bank or column. The pinions 3 during their rotation from the keyboard rotate with transfer cams 4 (Figure 2) which actuate transfer levers 5

so that a transfer or carry can be effected in the next column of higher order at the appropriate time. The improved zeroizing mechanism mainly includes a pinion or star wheel 6 in each bank or column coupled with each pinion and co-operating with toothed segments 7 which are distinct from the gear segments aforesaid which are actuated by the keys in the keyboard and which engage and rotate the pinions 3. The toothed segments 7 in the several columns are angularly movable on a transverse spindle or shaft 8 during the zeroizing operation, but during additive actuation of the machine the segments remain out of mesh with the star wheels 6. The pinions 3 are associated with spring pressed pawls 3^a (one of which is shown in Figure 1) which permit rotation of the pinions 3 and likewise the star wheels 6 which are connected thereto for example in a clockwise direction but prevent rotation for example in an anti-clockwise direction. The star wheels 6 in the several columns and the toothed segments 7 are so shaped that if for example the numeral wheels are already in their zero positions the segments move idly past the star wheels but should the numeral wheels be in some intermediate position the toothed segments rotate the wheels through the medium of the star wheels to the zero positions after which further movement of the toothed segments is idle, the segments serving to hold the star wheels stationary. In the example shown in the drawings each toothed star wheel 6 is provided with three teeth 10, 11 and 12 the angle embraced between the points of the first and second teeth 10 and 11 and the second and third teeth 11 and 12 is 108° whilst the angle embraced between the points of the third and first teeth 12 and 10 is 144°. Each toothed segment 7 for co-operation with the star wheel 6 shown in the drawings is provided with three substantially square faced teeth the outer edges of which lie along the circumference of a circle which reaches to the roots of the star wheel teeth whereby the segment is enabled to turn the star wheel through nine-tenths of a revolution, that is to say, through three-tenths of a revolution for each tooth of the segment which in the decimal system of notation would correspond with the turning of the numeral wheels through three places per tooth or nine places for the complete movement. The position of the toothed star wheels 6 in Figure 1 corresponds to the zero position of the numeral wheels and in this position the star wheel 6 presents the aforesaid 144° angle to the segment and con-

sequently the segment 7 is permitted to pass down between the face of the two teeth 12 and 10 without causing rotation of the said star wheel. Moreover, the star wheel 6 cannot move so long as the segment 7 is in position between the two teeth 12 and 10 and, therefore, the numeral wheel remains in the zero position. If for example the numeral wheel is in a position other than zero one of the teeth of the star wheel will lie in the path of the toothed segment 7 so that upon movement of the said toothed segment it engages the star wheel and rotates it to the position in which the numeral wheel stands at zero; further movement of the toothed segment thereafter is idle. When all of the numeral wheels are moved to the zero position the toothed segments can swing idly back into their inoperative positions shown in Figure 1 in which the lowermost tooth of the segment 7 lies outside the path of the star wheel 6. Means are provided for limiting the upward and downward movement of the toothed segment 7 and in the example shown these means comprise a transverse rod 13 passing through a suitably shaped opening 14 in each toothed segment. The toothed segments in the example shown are operated through the medium of a transverse rail or bar 9 pivoted on the spindle or shaft at 8 and to which movement can be imparted upon turning a zeroizing handle (not shown) about its pivot, the arrangement being similar to the transverse rail described in the specification of our prior Patent No. 360,377. The transverse rail or bar 9 is attached to each toothed segment 7 through the medium of tension springs 15 so as to provide a yielding connection to prevent damage to the parts should for example an accidental block occur in the mechanism as for instance if the operator should depress a key during the zeroizing operation. One edge of the transverse rail or bar 9 contacts with the gear segment 7 at the point 16 and the said transverse rail or bar 9 may be connected to another spring (or springs) which normally maintains the said rail and the toothed segments in their inoperative positions as shown in Figure 1. It will be appreciated that if an incomplete movement of the zeroizing handle is made with the result that all of the numeral wheels are not moved to the zero position the toothed segments 7 will be prevented from returning to their inoperative positions due to the pinions 3 to which the star wheels 6 are connected being prevented from rotating in an anti-clockwise direction by virtue of the associated spring pressed pawls 3^a. Consequently the gear

segments 7 will remain in mesh with the respective star wheels 6 so that the pinions 3 will be locked against both backward and forward movement and in such position key actuation will not be possible. In this position further movement must be imparted to the zeroizing handle to return all the wheels to the zero position. The arrangement is such, therefore, that after an initial movement of the zeroizing handle the operation must be properly completed before further key actuation of the machine is possible.

From the above description it is seen that the zeroizing or cancelling operation is effected by rotating the pinions and also the numeral wheels which are coupled thereto positively in the additive direction to the zero position, that is to say, in the same direction in which they are moved during key actuation without the necessity of utilizing the transfer mechanism and without utilizing the springs that are tensioned during key actuation.

As aforesaid the cams 4 and the transfer levers 5 serve to impart a transfer or carry to the numeral wheel in the adjacent column and in order to put the transfer mechanism out of action during the zeroizing operation means are provided for rendering the said transfer mechanism ineffective during such operation. These means may take a variety of forms and one form of these means is shown in Figure 2. The means shown is suitable for use in connection with transfer mechanism in which a snail cam 4 is provided rotatable with a pinion and adapted to turn a transfer lever 5 about its pivot which lever carries a pawl 17 adapted to be pressed into engagement with the pinion 3 in the next column of higher order and to rotate this pinion at the appropriate time to effect the transfer operation. The transfer pawl 17 is pivotally mounted at 19 on the transfer lever 5 which in turn is pivotally mounted on a transverse spindle 20. During key actuation of the machine the cam 4 is rotated in a clockwise direction and moves the transfer lever 5 about its pivot 20 in a clockwise direction and during such movement the transfer pawl 17 moves from engagement with the tooth 21 of the pinion 3 in the next column to engage the tooth 22 and as the peak of the snail cam 4 passes from the transfer lever 5 consequent upon movement of a numeral wheel in the lower column to zero position the transfer lever moves back under the action of a spring (not shown) to the original position shown in Figure 2 carrying with it the transfer pawl 17 which thereby moves the pinion 3 forward one tooth to effect the transfer or carry from the pinion of lower order

which rotates the snail cam 4 in Figure 2 to the pinion 3 which is disposed in the next column of higher order. In order to render this transfer mechanism inoperative the transfer lever 5 is provided with a tail 23 and the transfer pawl 17 is also provided with a tail 24 which project into the path of a transverse rail 25 which is pivoted on the spindle 20 about which it is adapted to move to engage the tails 23 and 24 in all of the column of the machine so that when the said rail 25 is moved about its pivot all of the transfer lever and the said transfer pawls are moved out of engagement with their respective cam and pinions thus rendering the transfer mechanism inoperative during the zeroizing operation. For the purpose of imparting movement to the transverse rail 25 the latter as shown in Figure 2 is connected by a link 26 to an arm 27 which is attached to the transverse rail or bar 9 which actuates the toothed segments 7 whereby upon movement being imparted to the said transverse rail 9 to operate the gear segment 7 a simultaneous movement is imparted to the transverse rail 25 to render the transfer mechanism inoperative.

It is to be understood that the invention is not to be limited to the above described details of construction since the mechanism is capable of variation. For example, the shape of the pinions or star wheels 6 and the toothed segments may be varied and the number of teeth and the relationship thereof may be varied to meet particular conditions. The invention can be used in machines having any suitable type of transfer mechanism and the means for rendering the transfer mechanism inoperative will naturally be varied to suit the particular form of transfer mechanism used.

The invention can be applied to machines operating on the decimal system of notation; to machines operating on the English monetary system or to machines operating on any other system. The invention can also be applied to full keyboard machines or to machines having only a partial keyboard.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

1. In a calculating or adding machine the provision of zeroizing mechanism including a toothed segment or the like in each column or bank having a predetermined angular movement and adapted to engage, during the zeroizing operation a star wheel associated with each numeral wheel of the machine, the arrangement

being such that the toothed segment is adapted to rotate the star wheel until the zero position is reached, the star wheel in this position being retrained from further movement by the toothed segment and until the latter is returned to its original position.

2. Zeroizing or cancelling mechanism as in claim 1, wherein the star wheels are fixed to rotate with each numeral wheel and are moved in the additive direction to the zero position, that is to say, in the same direction in which they are moved during key actuation the numeral wheel being restrained from further movement when they are in the zero position.

3. Zeroizing or cancelling mechanism as in claim 1 or 2, wherein the teeth of the star wheels are so disposed that when the associated numeral wheels are in the zero position the associated gear segments can move idly past the said star wheels and restrain the star wheels from further movement.

4. Zeroizing or cancelling mechanism as in any of the preceding claim, wherein the arrangement is such that the numeral wheels are locked to prevent key actuation of the machine should an incomplete action of the zeroizing mechanism occur.

5. Zeroizing or cancelling mechanism as in any of the preceding claims, wherein the star wheels are connected to pinions which are rotated to angularly move the said numeral wheels during key actuation of the machine, means being provided for preventing rotational movement of the said pinions in one direction.

6. Zeroizing or cancelling mechanism as in any of the preceding claims, having pinions connected to the star wheels and gear segments for rotating the pinions and numeral wheels during key actuation, the said gear segments being normally out of mesh with said pinions.

7. Zeroizing or cancelling mechanism as in any of the preceding claims, wherein the toothed segments are pivotally mounted and means are provided for limiting their pivotal movement.

8. Zeroizing or cancelling mechanism as in any of the preceding claims wherein each star wheel includes two gear teeth the angle embraced between the said teeth being such as to permit the said toothed segments to move idly past the said teeth when the numeral wheels are in the zero positions.

9. Zeroizing or cancelling mechanism as in any of the preceding claims, wherein the star wheels are provided with three teeth the angles embraced between two sets of adjacent teeth being 108° whilst the angle embraced between the third set of teeth is 144° the said toothed segments each having three teeth preferably with square faces for co-operation with said star wheels.

10. Zeroizing or cancelling mechanism as in any of the preceding claims, wherein the toothed segments are turned about their pivots during the zeroizing or cancelling operation by the provision of a transverse rail or bar coupled to the said toothed segments through the medium of spring for the purpose specified.

11. A calculating or adding machine having zeroizing or cancelling mechanism as in any of the preceding claims and including transfer mechanism, wherein means are provided for rendering the transfer mechanism inoperative during the zeroizing or cancelling operation.

12. A calculating or adding machine as in claim 11, wherein the transfer mechanism includes a transfer lever having a transfer pawl for engagement with an associated pinion, the said means being adapted to move the said transfer lever out of the path of an associated cam and the transfer pawl out of the path of the teeth of its associated pinion during the zeroizing or cancelling operation.

13. A calculating or adding machine as in claim 12, wherein each transfer lever and transfer pawl is moved out of the path of the respective cam and pinion by a transverse rail which is coupled to the transverse rail which moves the toothed segments so that upon movement of the toothed segments simultaneous movement is imparted to all of the transfer levers and transfer pawls.

14. In a calculating or adding machine the provision of zeroizing or cancelling mechanism substantially as described and/or as shown in the accompanying drawings.

Dated this 30th day of November, 1933.

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England, and
19—25, West 44th Street, New York,
U.S.A.,
Agents for the Applicants.

[This Drawing is a reproduction of the Original on a reduced scale.]

Fig. 1.

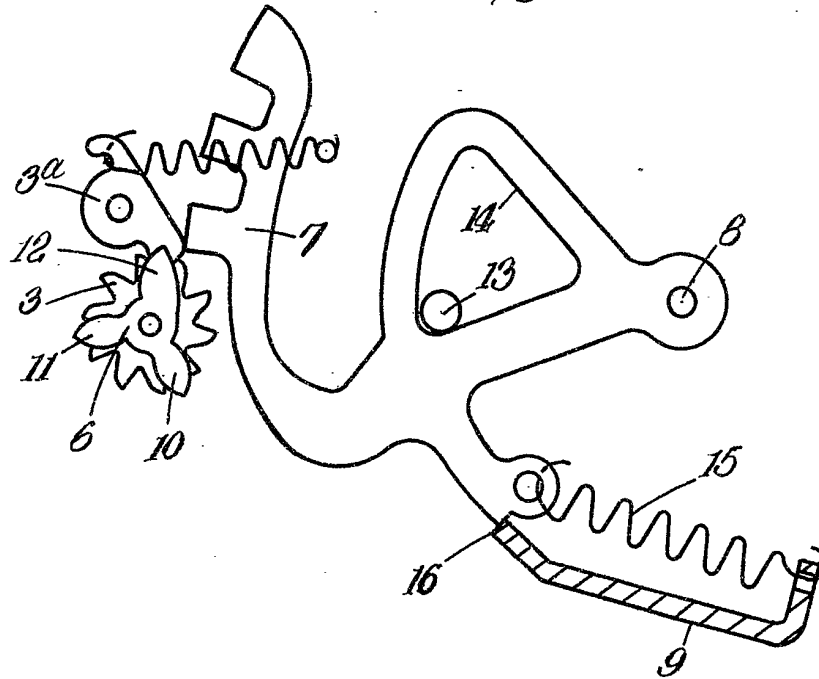


Fig. 2.

