

PATENT SPECIFICATION

360,375

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PROVISIONAL 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** **PETTER**, 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 calculating or adding machines of the multiple bank type having a series of ordinal keys in each bank and in which a differential actuating rack is adapted to rotate a numeral wheel to an extent depending upon the particular key depressed.

The main object of the present invention is to provide an improved mechanism for positively locking the differential rack to the numeral wheel in one direction of movement of the rack and for causing disassociation of the rack with the wheel upon the return movement. Further objects of the present invention are to provide an improved and compact machine of the above type having an improved arrangement of actuating levers and in which the shock of the arrest of the keys is not transmitted to the numeral wheels.

According to the invention the differential rack comprises a pivotally mounted segment which is arranged so as to be positively locked to the numeral wheel in one direction of its movement and move out of engagement with the wheel upon the return movement thereof. The segmental rack is adapted to engage with a pinion associated and rotating with the numeral wheel the pinion preferably being provided with a ratchet pawl for allowing rotation in one direction, for example, a clockwise direction and for preventing rotation in the reverse direction. The segmental rack is pivotally mounted upon a lever which is pivoted upon a spindle mounted in the frame of the machine. Pivotally mounted upon the same spindle as the segment lever is an actuating lever which is provided with a pin at one end adapted to engage in a slot provided in the segmental rack. The said slot is preferably of a substantially triangular shape in form and the pin is adapted to lie in the apex of the slot during the positive actuation of the numeral wheel. The

upper edge of the actuating lever is preferably of serrated form the inclined edges of the serrations being adapted to be engaged by said keys upon their downward stroke. It is preferred to arrange the keys so that their strokes are equal in length whereby the lower ends of the keys may be arrested due to their contact with a flange or angle plate provided upon an appropriate part of the machine. The segment lever is preferably provided with a number of lugs or fingers which are adapted to abut against the keys in their downward limit of travel so as to arrest the movement of the segmental rack.

According to one specific embodiment of the invention, a pinion is provided freely mounted upon a transverse spindle. The pinion may have ten teeth and is preferably associated with a ratchet pawl which is arranged so as to permit rotation in one direction for example a clockwise direction and to prevent rotation in the reverse direction. A numeral wheel is provided which is adapted to rotate with the pinion and carries around its periphery numbers, for example, 0 to 9, one number of which is at any time visible through a window provided in a casing enclosing the machine. The pinion is adapted to be actuated by means of a segmental rack which engages the pinion on the downward stroke of any one of the keys and is adapted to disengage with the pinion upon the upward stroke of the machine and to lie in its inoperative position completely out of engagement with the pinion teeth. For the purpose of imparting motion to the said segmental rack a lever system is provided which is so arranged that the segmental rack will drive the pinion in a clockwise direction but which will permit the segmental rack to yield and slip past the teeth upon the return stroke. The segmental rack is pivotally mounted upon the segment lever at a convenient distance behind the pitch circle of the rack the segment lever being in turn pivoted upon a spindle mounted in the frame of the machine. The segment lever is pivoted between its ends which extend along the bank of keys and is provided upon its upper surface with

lugs or fingers corresponding in number to the number of keys for the purpose hereinafter stated. Pivotaly mounted upon the same axis or spindle as the segment lever is an actuating lever which is provided with a pin at its end opposite to the point of pivotation which is adapted to engage in a substantially triangular shaped slot formed in an extension of the segmental rack. The pin is adapted to lie in the apex of the slot upon the downward stroke of the rack for the purpose of imparting motion to the numeral wheel. The actuating lever extends beneath the keys and is serrated upon its upper edge the inclined surfaces of the serrations being engaged by the keys upon the downward stroke thereof. The serrations are of an irregular form and the edges are so inclined whereby the proper extent of movement of the actuating lever is afforded depending upon the particular key depressed. One end of the actuating lever engages with a stop for limiting its return movement and a spring is provided for returning the actuating lever to its initial position after the release of any one of the keys. A further spring is provided and connected with the segment lever for maintaining the latter in its appropriate position. The end of the segment lever is preferably provided with a lug which is adapted to engage with the wall of the machine to assist in maintaining the segment lever in its correct lateral plane. The keys are accommodated in upper slots in the cover of the machine and in lower slots in a flanged or channel member secured to the wall or dividing partitions separating the adjacent banks of keys. The keys are reduced in width at their lower ends so as to provide at their upper ends shoulders which engage with the serrated edge of the actuating lever. The keys are preferably surrounded at their reduced part by springs which abut against the shoulder at the upper end and against the upper flange of the channel member for the purpose of returning the keys to their initial position. The stroke of the keys is preferably of the same length and the extent of travel is defined by the engagement of the lower ends of the keys with the lower flange of the channel member. As aforesaid the shape of the serrated top edge of the actuating lever determines the extent of the angular movement thereof corresponding to the particular key depressed. The lugs or fingers on the upper edge of the segment lever come into engagement with the shoulders of the keys when the movement of the key is arrested by engagement with the lower flange of the channel so that movement of the segmental rack is also

arrested.

In operation when one of the keys is depressed the shoulder thereon engages the actuating lever causing the latter to be angularly displaced about its pivot, which causes the serrated rack to be moved into engagement with the pinion thereby imparting rotary motion to the pinion to an extent defined by the movement imparted to the actuating lever in turn defined by the particular key which is depressed. Movement is also imparted, upon depression of a key, to the segment lever by means of the segmental rack which as aforesaid is pivoted thereon. The extent of the downward movement of the key is determined by the engagement of the lower end thereof with the lower flange of the channel member and in the extreme position of its movement the appropriate lug or finger on the segment lever engages with the rear edge of the shoulder provided on the key and thereby prevents further movement being imparted to the segmental rack. Upon release of the key the parts return to their initial position through the medium of the aforementioned springs. The numeral wheel is prevented from rotation by means of its pawl and the segmental rack moves out of engagement with the pinion, being permitted to do so by virtue of the substantially triangular shaped slot and due to the fact that the segmental rack is pivoted to the segment lever at a point located at a suitable distance behind the line of engagement of the segmental rack and the pinion. So long as the key is held depressed the mechanism is locked so that the segmental rack cannot come out of engagement with the pinion but as soon as the finger of the operator is removed the key returns to its initial position under the influence of its spring. The lugs or abutments provided upon the segment lever are of such dimensions as not to engage the shoulders on the keys when the latter are in their inoperative position, for example if the 5 key is depressed the 4 abutment on the segment lever will clear the shoulder on the 4 key.

In a full bank of keys ranging from 1 to 9, only those keys whose line of action lies between the pinion and the pivot of the actuating lever are conveniently placed for engaging the serrated edge of the actuating lever. For keys acting on the other side of the aforesaid pivot an auxiliary actuating lever is provided having a serrated upper edge of similar construction to that described above. The auxiliary actuating lever is mounted for angular movement and is adapted to engage the aforesaid actuating lever above described by means of an extension of the auxiliary actuating lever co-acting

with an extension or finger of the actuating lever. If the whole range of such keys cannot be conveniently embraced by a single auxiliary actuating lever two or
 5 more of these may be employed. An auxiliary segment lever is also provided for those keys which lie beyond convenient reach of the aforesaid segment lever, for example, for keys 6, 7, 8, 9, having a
 10 number of lugs or abutments upon its upper edge and adapted to slide in suitable guides and to be engaged by a pin provided on the segment lever above referred to. The end of the auxiliary segment lever is provided with a depression
 15 in which the pin of the segment lever is located. The engagement between the pin and the auxiliary segment lever takes place after the segment lever has moved through an angle corresponding with a
 20 pinion movement of for example 5 teeth and before the movement of the sixth tooth is completed so that the auxiliary segment lever serves to make the arrest
 25 for the sixth tooth movement and for the arrest of the movements up to for example, nine teeth. It will be appreciated that neither the auxiliary actuating lever nor the auxiliary segment lever moves when
 30 one of those keys is actuated which engage the main actuating or main segment levers only as they only come into operation when one of the keys within

their range is depressed. A spring may be provided for returning the auxiliary actuating lever to its initial position and the upper end thereof may abut against a stop similar to the arrangement previously described.

Similar systems of levers and the like are provided and associated with each bank of keys and if desired the invention may be employed in conjunction with the transfer mechanism described in our co-pending Application No. 23,257/30 (Serial No. 360,376) and with the zeroizing or cancelling mechanism referred to in our co-pending Application No. 23,258/30 (Serial No. 360,377).

Although the invention has been described above in connection with the decimal notation system the invention is also applicable to other notations for example the English monetary system. Moreover the invention may be applied to a machine having only a partial range of keys for example a range of keys from 1 to 5.

Dated this 1st day of August, 1930.
 HASELTINE, LAKE & Co.,
 28, Southampton Buildings, London,
 England, and
 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 PETTER, 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 described and ascertained in and by the following statement:—

This invention relates to calculating or adding machines of the multiple bank type having a series of ordinal keys in each bank and in which a gear segment rotates a pinion associated with a numeral wheel upon depression of one of the keys to an extent depending upon the particular key depressed.

One of the objects of the present invention is to provide an improved and compact machine of the above type in which the actuating mechanism is so constructed and arranged that it may be accommodated in a casing which extends at the back only slightly beyond the rear keys:

A further object is to provide an improved mechanism for causing engagement of the gear segment with the pinion in one direction of movement thereof and for permitting an inoperative movement of the segment, relatively to the pinion on the return of said segment to the initial position. A further object is to provide a machine having an improved arrangement of actuating levers and in which the shock of the arrest of the keys is not transmitted to the levers or any part of the actuating mechanism.

According to the invention the gear segment is carried by a segment lever extending along a bank of keys and pivotally mounted substantially midway between its ends and means are provided for causing the keys, of the bank with which the segment lever is associated, on both sides of the pivot of said lever to impart unidirectional motion thereto upon depression of one or other of said keys. The gear segment may be pivotally mounted upon the segment lever and is

preferably arranged so as to engage and rotate the pinion in one direction of its movement and to move past the teeth of the pinion or out of operative engagement therewith upon its return movement, the rotational movement of the pinion being restrained in the reverse direction preferably by means of a ratchet pawl. Movement is imparted to the segment lever by means of an actuating lever which actuates the gear segment through the medium of a pin and slot connection. The pin may be carried by the actuating lever or by an operating member and the slot may be formed in the gear segment. The pin is adapted to lie at one end of the slot during actuation of the numeral wheel whereby the segment is caused positively to engage the pinion of the numeral wheel, but during the return movement of the segment the pin travels up the slot so as to permit the segment to swing away from or out of operative engagement with the pinion, the arrangement being such that the gear segment in its inoperative position lies completely out of engagement with the pinion. The upper edge of the actuating lever is preferably of serrated form the inclined edges of the serrations being acted upon by the keys upon their downward stroke. It is preferred to arrange the keys so that their strokes are equal in length whereby the keys may be arrested by their contact with a bar or other fixed part of the machine. The segment lever is preferably provided with a number of stops which are adapted to abut against the respective keys when the said keys are at their downward limit of travel so as to arrest the movement of the segment.

The mechanism according to the invention may be employed in connection with a partial keyboard machine or in connection with a machine having a full range of keys. One or more auxiliary actuating levers may be provided operating in association with the actuating lever above referred to. Where the invention is employed in connection with a full keyboard machine the segment lever is preferably associated with an auxiliary segment bar.

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 which illustrate several forms of the invention as applied by way of example to calculating or adding machines operating in the decimal system of notation and in which:—

Figure 1 illustrates in side elevation one form of actuating mechanism according to the invention and applied to a partial

keyboard machine;

Figure 2 is a view similar to Figure 1 but showing the position of the mechanism when the key 5 is depressed;

Figure 3 is a view similar to Figure 2 showing the position of the mechanism when the key 5 has partly returned to its initial position;

Figure 4 is a view similar to Figure 1 showing a modified arrangement;

Figure 5 is a view similar to Figure 1 but illustrating the invention as applied to a full keyboard machine;

Figures 6 and 7 illustrate in detail in side and front elevations respectively the keys employed in machines according to the Figures 1 to 5, and

Figure 8 is a perspective view of a modified form of the invention.

In the application of the invention to partial keyboard machines five keys may be employed numbered 1, 2, 3, 4 and 5. When for example it is desired to add the number 6, 7, 8 or 9 it is necessary to depress two keys in succession. For example when it is desired to add the numeral 9 the "4" and "5" keys are successively depressed. For adding the numeral "8" the "4" key is depressed twice and so on.

Referring now to Figures 1, 2 and 3 of the drawings which show the invention as applied to a partial keyboard machine, five keys are provided numbered 1, 2, 3, 4 and 5. Reference numeral 11 is a pinion freely mounted upon a transverse spindle 12. The pinion has ten teeth and is associated with a ratchet pawl 13 which is arranged so as to permit rotation in a clockwise direction and to prevent rotation in the reverse direction. A numeral wheel 14 rotates with the pinion and carries around its periphery the figures, 0 to 9 one of which is at any time visible through a window 15 provided in the casing 16 enclosing the machine. The pinion is actuated by means of a gear segment 17 which engages and drives the pinion forward on the downward stroke of any one of the keys and is adapted to disengage the pinion upon the upward stroke and to lie in its inoperative position completely out of engagement with the pinion teeth, as shown in Figure 1. To effect this purpose the gear segment 17 is pivotally mounted at 19 upon a segment lever 18, the pivot 19 being located at a convenient distance behind the pitch circle of the gear segment 17. The segment lever in turn is pivoted upon a spindle 20 mounted in the frame of the machine. The segment lever is pivoted towards the middle of its length and extends along the bank of keys and is provided upon its upper surface with stops 21 corresponding in number with the number of keys for the

purpose hereinafter stated. The keys 1, 2 and 3 co-operate with an actuating lever 22 which is pivotally mounted on the same axis or spindle as the segment lever 18. The actuating lever 22 has at its forward end a pin 23 which projects into a slot 24 formed in an extension of the gear segment 17. The slot 24 is of a substantially triangular shape and the pin 23 is adapted to lie in the apex of the slot on the downward stroke of the gear segment 17 whereby the gear segment 17 is moved into engagement with the pinion 11. Co-operating with the keys 4 and 5 is an auxiliary actuating lever 38 pivoted at 39. The auxiliary lever 38 engages the lever 22 by means of an arm or extension 40 co-acting with an arm 41 on the lever 22. The actuating lever 22 and the auxiliary actuating lever 38 extend beneath the keys and are serrated upon their upper edges the inclined surface 27 of the serrations being engaged by shoulders 34 on the keys upon the downward stroke thereof. The serrations are formed so that the edges are suitably inclined whereby the proper extent of movement of the actuating levers is afforded depending upon the particular key depressed. A stop 28 may be provided for limiting the upward movement of the actuating lever 22 or alternatively the lever may come to rest in contact with the shoulders of the keys. A similar stop 38^a may be provided for limiting the movement of the auxiliary actuating lever 38. The segment lever 18 is maintained in the position shown in Figure 1 by means of a spring 26. A spring 25 is provided attached at one end to the actuating lever 22 tending to draw the pin 23 up the slot 24. The other end of the spring 25 may be attached to a fixed point or to the segment lever as shown in the Figure 1. When the actuating lever is in the position shown or while during motion it is in contact with one of the keys the spring 26 is effective to overcome the tension of the spring 25 and to hold the pin 23 at the bottom of the slot 24. A further spring 38^b may be provided which assists the auxiliary actuating lever 38 in returning to the position shown in Figure 1. On the depression of one of the keys 1, 2 or 3 the actuating lever 22 the gear segment 17 and the segment lever 18 move as one piece and the gear segment 17 enters into positive engagement with the pinion 11 moving it forward by an amount determined by the particular key depressed. The auxiliary actuating lever 38 remains stationary when the 1, 2, and 3 keys are depressed but when either the 4 or 5 key is depressed the auxiliary actuating lever is turned about its pivot 39 causing in turn

angular displacement of the lever 22 as shown in Figure 2.

The keys are accommodated in upper slots 30 in the cover 31 of the machine and in lower slots 32 in a flanged or channel member 33 secured to a side wall or dividing partition separating the adjacent banks of keys. The keys are reduced in width at their lower ends as shown in Figures 6 and 7 so as to provide at their upper ends the shoulders 34 which engage with the serrated edges 27 of the levers 22 and 38. The keys are surrounded at their reduced parts by springs 35 which abut against the shoulders 34 and against the upper flange 36 of the channel member for the purpose of returning the keys to their initial positions, pins 120 limiting the upward movement of the keys. The strokes of the keys are preferably of the same length and the extent of travel is defined by the engagement of the lower ends of the keys with the lower flange 37 of the channel member 33. As aforesaid the shape of the serrations 27 of the actuating levers is such as to permit the proper extent of angular movement thereof according to the particular key depressed. The stops 21 on the upper edge of the segment lever 18 come into engagement respectively with the shoulders of the keys at the same time as the latter are arrested due to their engagement with the lower flange of the channel whereby the movement of the segment 17 is also arrested. So long as a key is held at the bottom of its travel as shown in Figure 2 the mechanism is locked so that the segment cannot come out of engagement with the pinion, but as soon as the finger of the operator is removed the key returns to its initial position under the influence of its spring 35. The gear segment and segment lever are now momentarily held by the non-return effect of the pinion whereby the spring 25 is enabled to raise the pin 23 in its slot and so allow the gear segment to disengage the pinion as shown in Figure 3.

The stops 21 provided upon the segment lever are of such dimensions as not to engage the shoulders of the keys when the latter are in their inoperative position; for example, if the "5" key is depressed the stops 21 associated with the keys 1, 2, 3 and 4 will clear beneath the shoulders of those keys.

It will be appreciated that by pivoting the segment lever 18 substantially midway between its ends the whole mechanism can be accommodated in a casing which extends only slightly beyond the rear keys, this constituting an important feature of the present invention.

Instead of employing the actuating lever 22 and the auxiliary actuating

lever 38 a single actuating lever co-operating with all of the keys 1 to 5 may be employed. Figure 4 of the accompanying drawings illustrates such a construction. The reference numeral 55 illustrates the actuating lever which is pivoted at 56 upon a spindle mounted in the machine. The upper part of the actuating lever extends beneath the keys 1, 2, 3, 4 and 5 and has its upper edge serrated as at 27. An arm 57 of the lever 55 carries a pin 58 which is accommodated in a slot 59 in an operating member 60 pivoted at 20 on the same axis as that upon which the segment lever 18 is pivoted. The end of the operating member 60 opposite to the point of pivotation 20 has a pin 23 which is accommodated in the slot 24 in the gear segment 17 and operates in a manner similar to that described in connection with Figure 1. The actuating lever 55 is maintained in the position shown in Figure 4 by means of a spring 61 which normally urges the actuating lever against a stop 62. When any one of the keys is depressed the actuating lever 55 is angularly displaced which displacement turns the operating member 60 about its pivot 20 thereby causing the gear segment 17 to be moved into engagement with the pinion 11.

Figure 5 of the drawings show a lever system applicable to a machine having a full range of nine keys. The keys 1, 2 and 3 co-operate with an actuating lever 22 of similar construction to that illustrated in Figure 1 the keys 4 and 5 co-operate with an auxiliary actuating lever 38 as in Figure 1 while the keys 6, 7, 8 and 9 co-operate with a further auxiliary actuating lever 42 which is pivoted at 43 and provided with an arm 44 which co-acts with an arm 45 on the actuating lever 22. An auxiliary segment bar 46 is also provided for those keys which lie beyond the convenient range of the segment lever 18 for example for keys 6, 7, 8 and 9. The bar 46 is adapted to slide longitudinally in suitable guides provided in the machine and to be engaged by a pin 47 on the segment lever 18. The end of the auxiliary segment bar has a slot or its equivalent 48 in which the pin 47 is located. When the segment lever 18 is moved about its pivot the pin 47 travels along the slot without first engaging the auxiliary segment lever but after the segment lever 18 is moved through an angle corresponding with a pinion movement of for example five teeth and before movement of the sixth tooth is complete the pin 47 engages the end 39 of the slot so that the auxiliary segment bar serves to make the arrest for the sixth tooth movement and for the further movements up to, for

example, nine teeth. For the purpose of this arrest the auxiliary segment bar is provided with stops 50 corresponding to the stops 21 on the segment lever 18. It will be appreciated that neither of the auxiliary actuating levers nor the auxiliary segment bar moves when one of the keys is actuated which engages the main actuating or main segment levers. The former only comes into operation when one of the keys within its range is depressed. A spring 51 is provided for returning the auxiliary actuating lever 42 to its initial position and the upper end of the lever may abut against a stop 52.

It will be seen from Figure 5 that the mechanism is so constructed that the casing containing the mechanism extends only slightly beyond the rear key 9.

Figure 8 illustrates a further form of the invention as applied to a partial keyboard machine embodying certain modifications designed with a view to eliminating the necessity of employing so far as possible the use of springs. The gear segment 17 is pivoted upon the segment lever 18 which is pivoted on the spindle 20 substantially midway between its ends as described in connection with Figures 1, 2 and 3. The reference numeral 22 indicates the actuating lever which is pivoted on the spindle 20 and has its upper edge of serrated form for the purpose above referred to. The actuating lever has a pin 23 which projects into a slot 24 on the gear segment 17. The slot 24 (Figure 8) differs from the slot 24 of Figures 1, 2 and 3 in that it is a straight slot with parallel sides the pin 23 being a working fit in the slot. The slot 24 is inclined so that a normal to the surface of the slot lies well above the pivot 20 of the segment lever so as to permit the teeth of the gear segment to move past the teeth of the pinion 11 or out of operative engagement therewith upon the return stroke, the gear segment 17 causing the pin 23 to move upwardly in the slot 24 in so doing. This construction of slot enables the spring 25 shown in Figures 1, 2, 3 and 5 to be dispensed with. Instead of employing the auxiliary actuating levers 38 illustrated in Figure 1, two independent auxiliary actuating levers 63 and 64 are provided the lever 63 being operated by the key 4 while the lever 64 is operated by the key 5. The auxiliary actuating levers 63 and 64 are pivoted on a spindle 65 and operate against a projection 66 on the main actuating lever 22 in a similar manner as described in connection with Figure 1. It is not necessary to employ springs for returning the auxiliary actuating levers 63 and 64 to their initial positions as they are returned thereto upon the return

movement of the actuating lever 22 which in turn is moved to its initial position by the segment lever 18 through the medium of spring 18^a. Figure 8 also embodies a further modification in that the upper and lower limits of the travel of the keys is defined by the engagement of a projection or lug 67 on each key with the upper and lower edges of a slot 68 formed in the dividing partition 69 separating the adjacent banks of keys. The individual keys are returned to their initial position by means of springs which surround the reduced ends of the keys as shown in Figures 6 and 7 the reduced ends of the keys being guided in slots formed in the flange 70.

Similar systems of levers and gears are provided and associated with each bank of keys. The invention may be employed in conjunction with any suitable transfer mechanism and with any suitable zeroizing or cancelling mechanism.

Various changes may be made in the form and arrangement of the parts without departing from the working principles described. For example instead of employing an actuating lever or auxiliary actuating lever associated with a number of keys separate actuating levers may be employed for the several keys if so desired.

Although the invention has been described above in connection with the decimal system of notation it is also applicable to other notations for example the British monetary system.

In connection with the partial keyboard machines referred to above it is only feasible to employ these machines for adding, but in the full keyboard machines not only additions but also multiplications and other calculations may be effected.

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. A calculating or adding machine of the type referred to, wherein the gear segment is carried by a segment lever extending along a bank of keys and pivotally mounted substantially midway between its ends and means are provided for causing the keys, of the bank with which the segment lever is associated, on both sides of the pivot of said lever to impart unidirectional motion thereto upon depression of one or other of said keys.

2. A calculating or adding machine as in claim 1, wherein the rotational movement of the pinion is restrained in one direction and wherein the gear segment is pivotally mounted and arranged so as to engage and rotate the pinion in the un-

restrained direction of its movement and to move past the teeth of the pinion or out of operative engagement therewith upon its return movement.

3. A calculating or adding machine as in claim 1 or 2, wherein an actuating lever is provided having a direct or indirect co-operating engagement with the gear segment, said actuating lever being angularly displaced upon depression of one or other of the keys whereby the gear segment is caused to rotate the pinion.

4. A calculating or adding machine as in claim 3, wherein the actuating lever or an operating member connected therewith has a pin and slot connection with the gear segment the slot being so shaped as to permit the gear segment to swing out of engagement with the pinion in one direction of its movement.

5. A calculating or adding machine as in any of the preceding claims, wherein the gear segment is pivotally mounted upon the segment lever.

6. A calculating or adding machine as in claim 3, 4 or 5, wherein the segment lever and the actuating lever are resiliently connected.

7. A calculating or adding machine as in claim 3, 4, 5 or 6, wherein the upper edge of the actuating lever is serrated the inclined surfaces of the serrations being so shaped as to permit the proper extent of movement to be imparted to the gear segment.

8. A calculating or adding machine as in claim 5, 6 or 7, wherein the segment lever is provided with a number of stops which co-operate with the keys on their depressions.

9. A calculating or adding machine as in claim 3, 4 or 5, wherein an auxiliary actuating lever or levers is or are provided for co-operating with said actuating lever.

10. A calculating or adding machine as in any of the preceding claims 5 to 9, wherein an auxiliary segment bar is provided having a lost motion connection with the segment lever.

11. A calculating or adding machine as in any of the preceding claims, wherein the downward and upward movements of the keys are limited due to contact of the keys with a fixed part of the machine.

12. A calculating or adding machine as in claim 11, wherein the lower ends of the keys contact with a flanged or channel member attached to the sides of the machine or dividing partitions separating the several banks of keys for the purpose specified.

13. A calculating or adding machine as in claim 11, wherein the keys are provided with projections or lugs which project into slots the upper and lower edges

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of which limit the movement of the keys to any of the examples shown by the said slots being formed in dividing partitions separating the several banks of keys. accompanying drawings.

14. A calculating or adding machine as
5 in any of the preceding claims 3 to 13,
wherein the keys have shoulders which co-
operate with the actuating lever or
auxiliary actuating levers.

15. A calculating or adding machine
10 substantially as described with reference

Dated this 17th day of March, 1931.

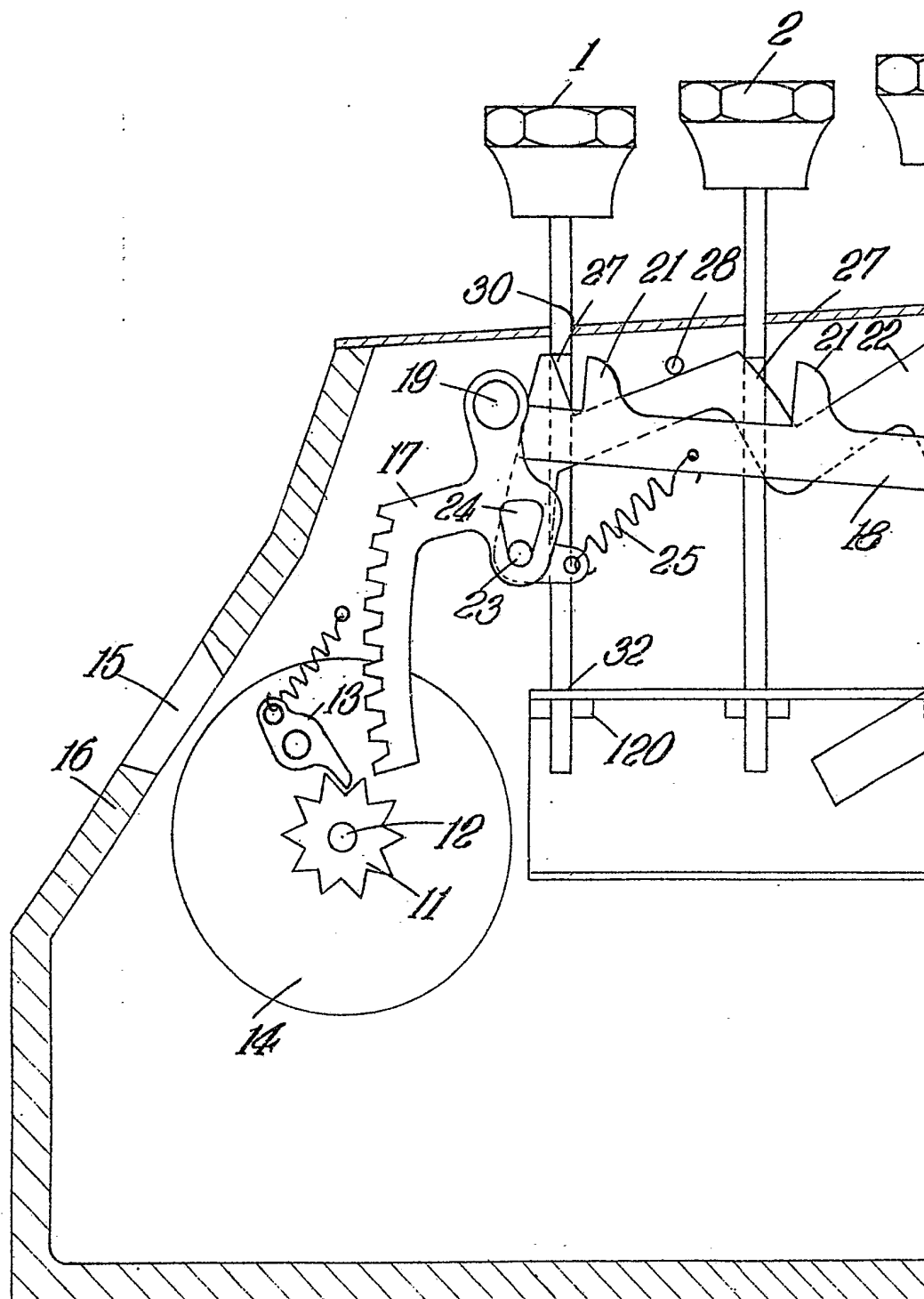
HASELTINE, LAKE & Co.,
28, Southampton Buildings, London,
England, and

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

Agents for the Applicants.

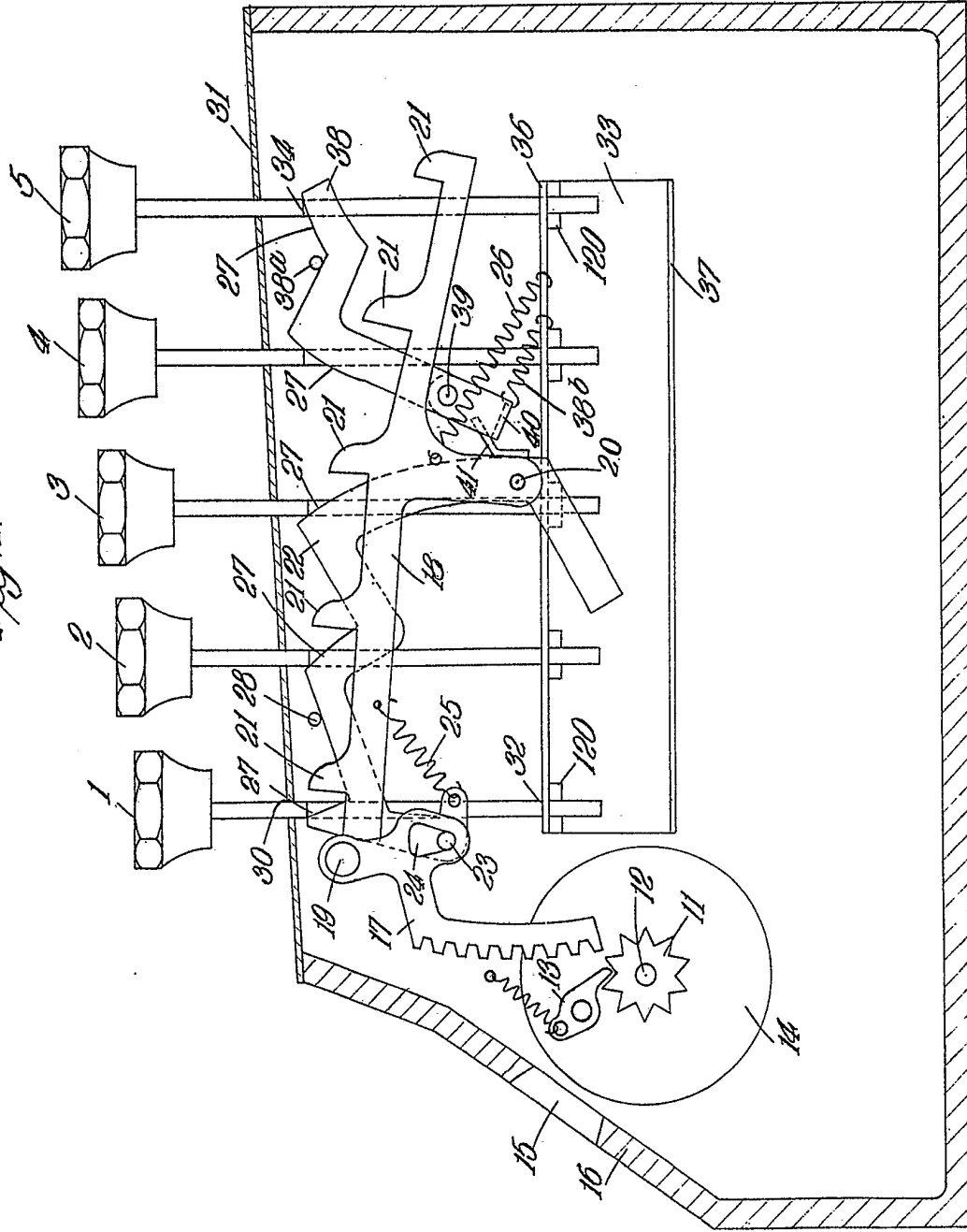
Redhill: Printed for His Majesty's Stationery Office, by Love & Malcomson, Ltd.—1931.

Fig. 1



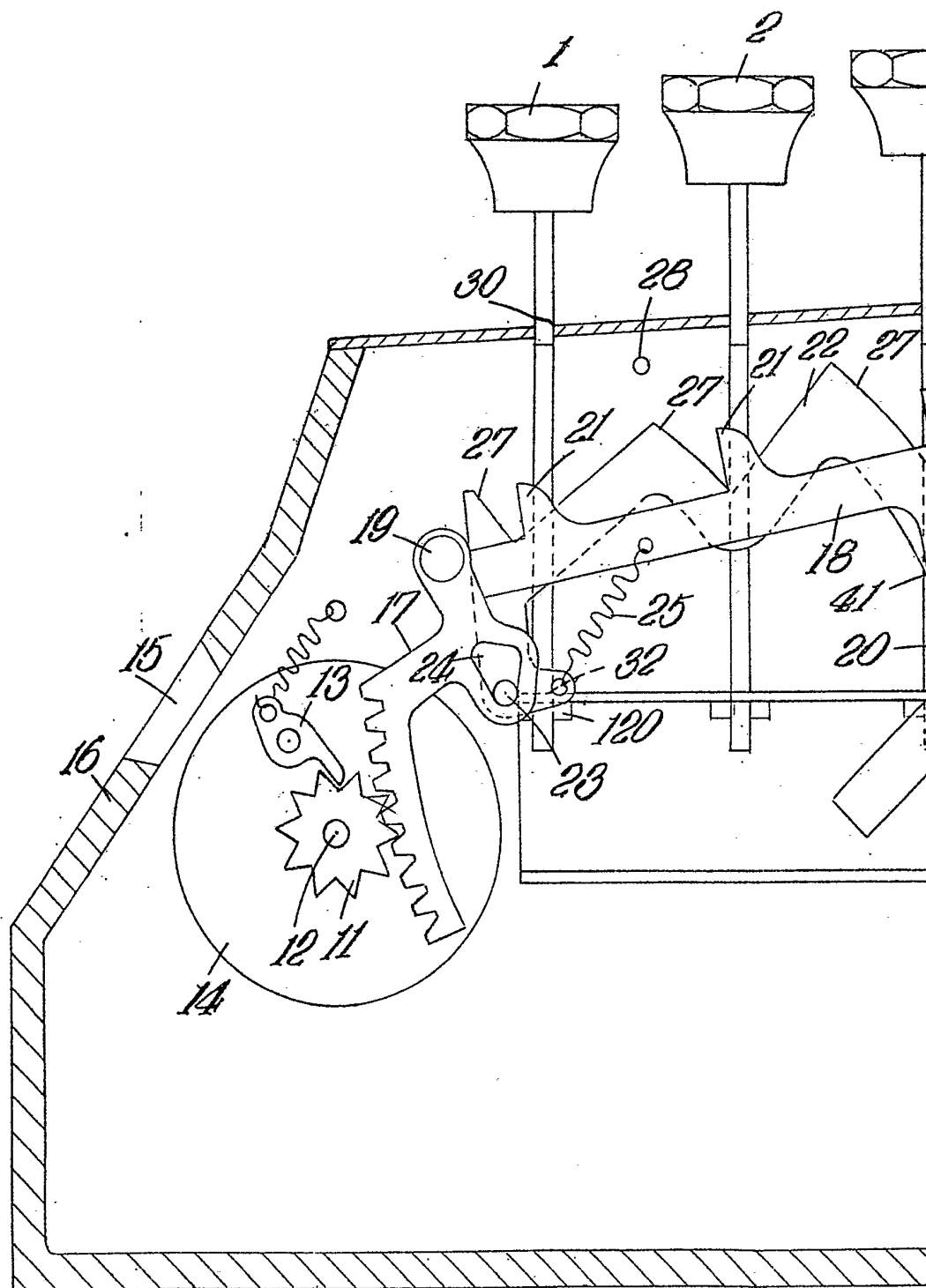
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Fig. 1.



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Fig. 2.



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Fig. 2.

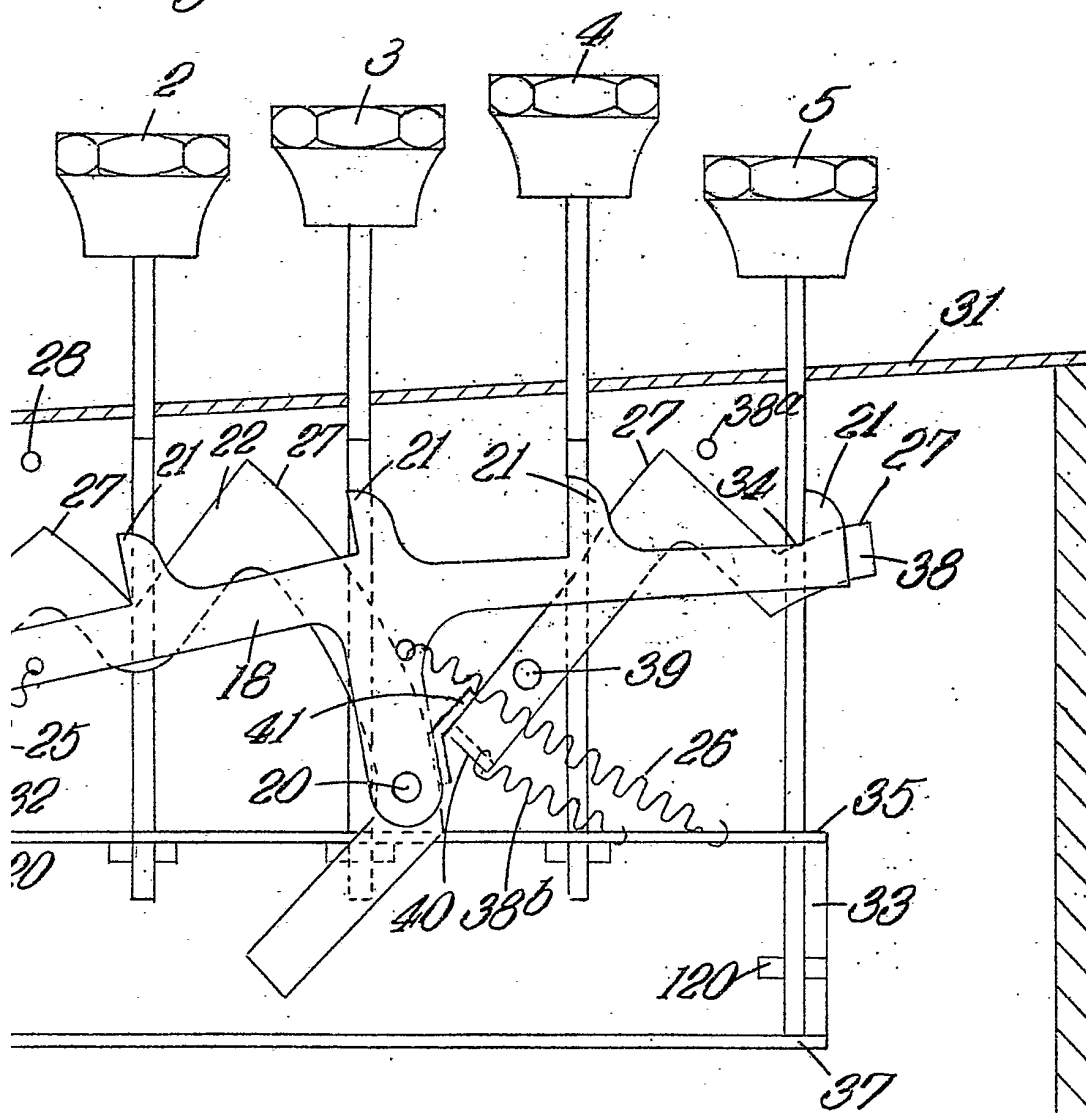
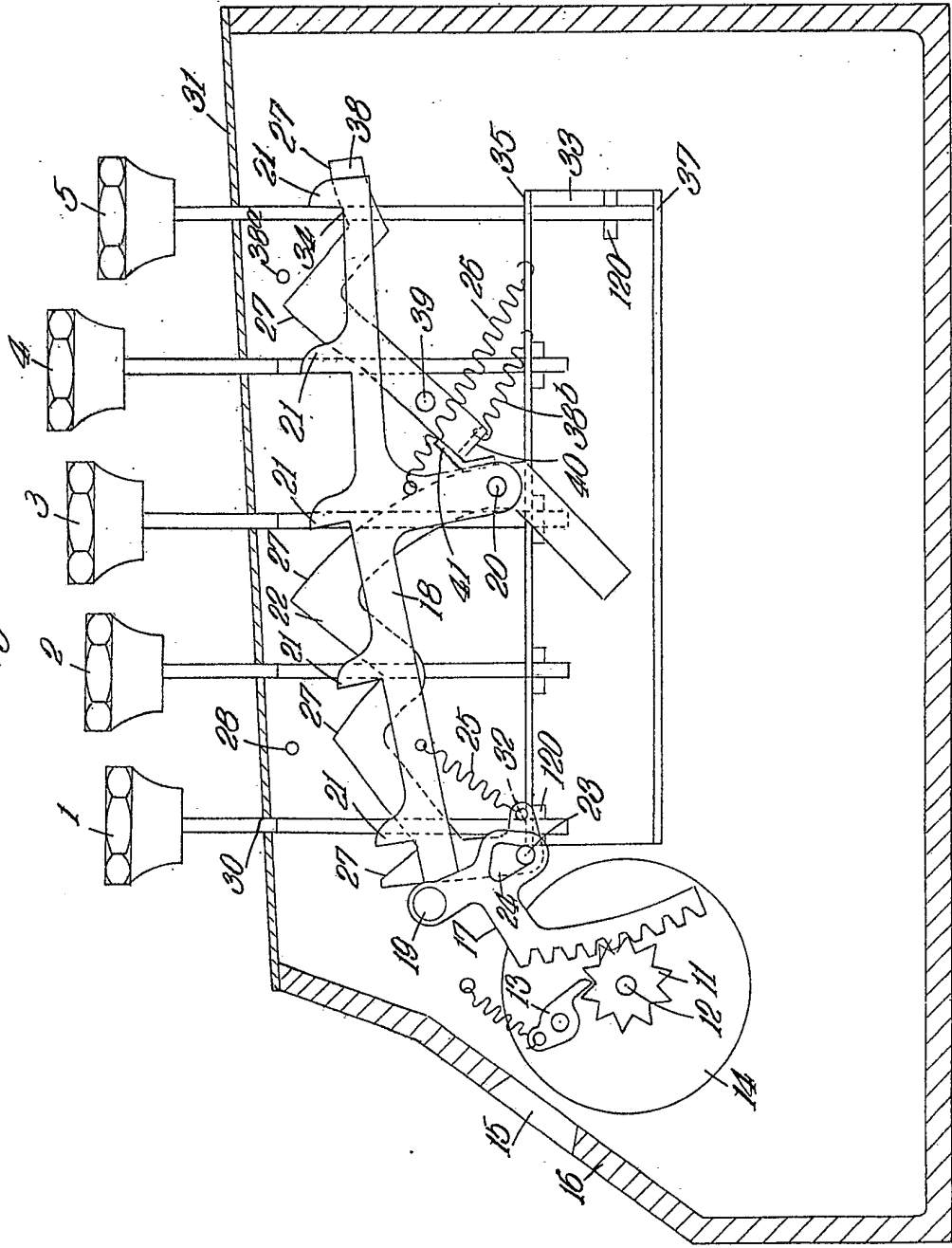
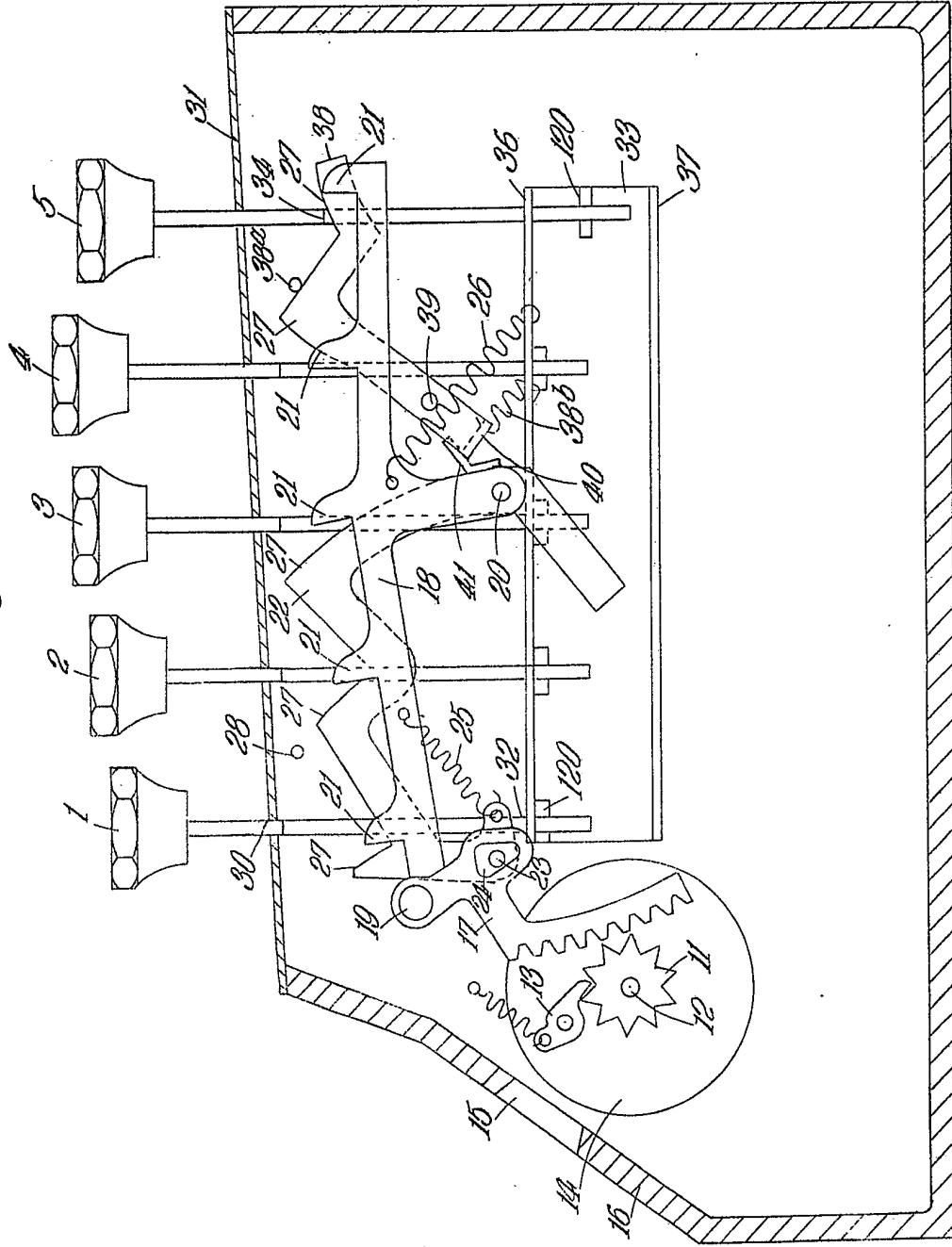


Fig. 2.



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Fig. 3.



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Fig. 4.

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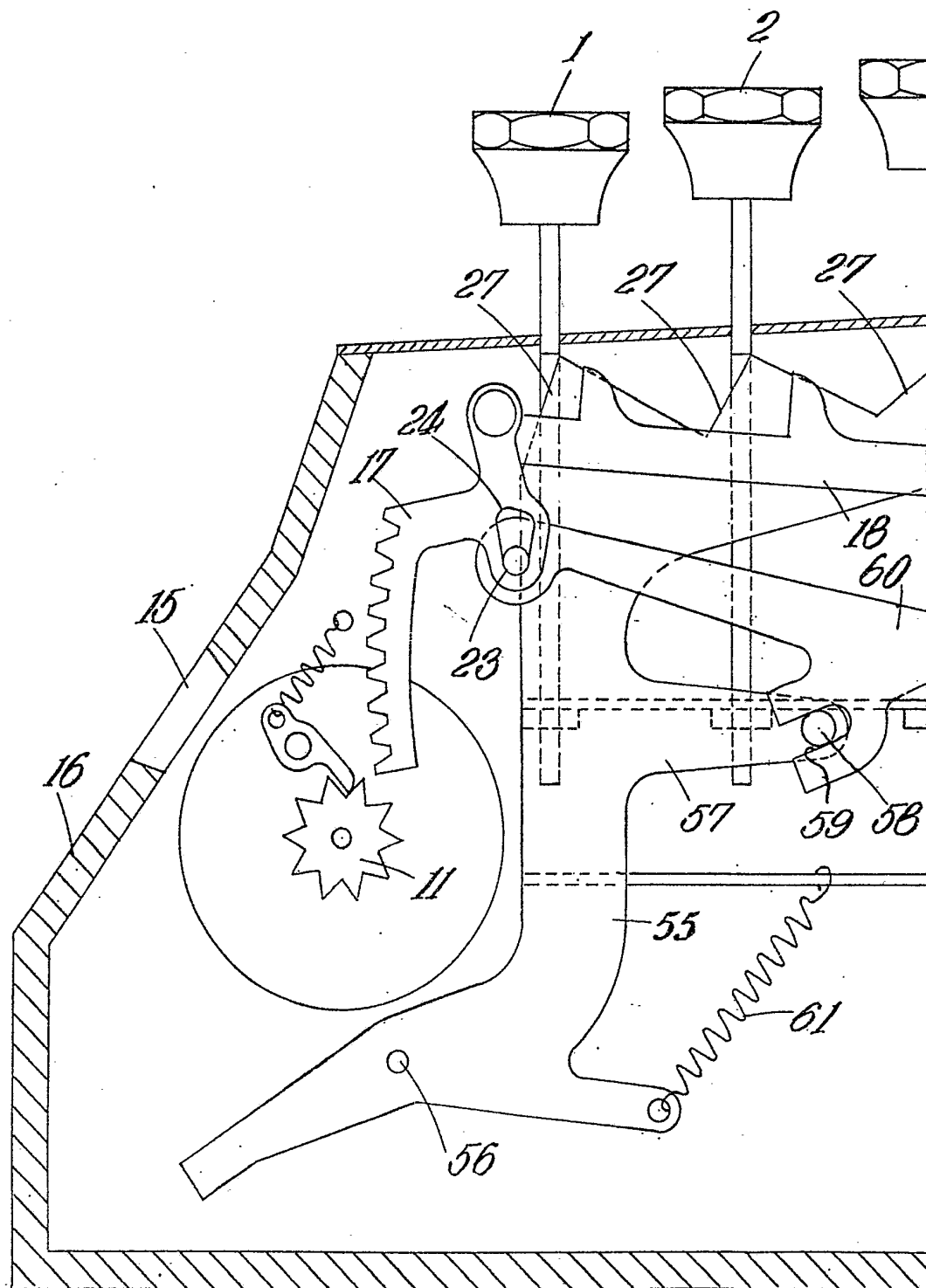


Fig. 4.

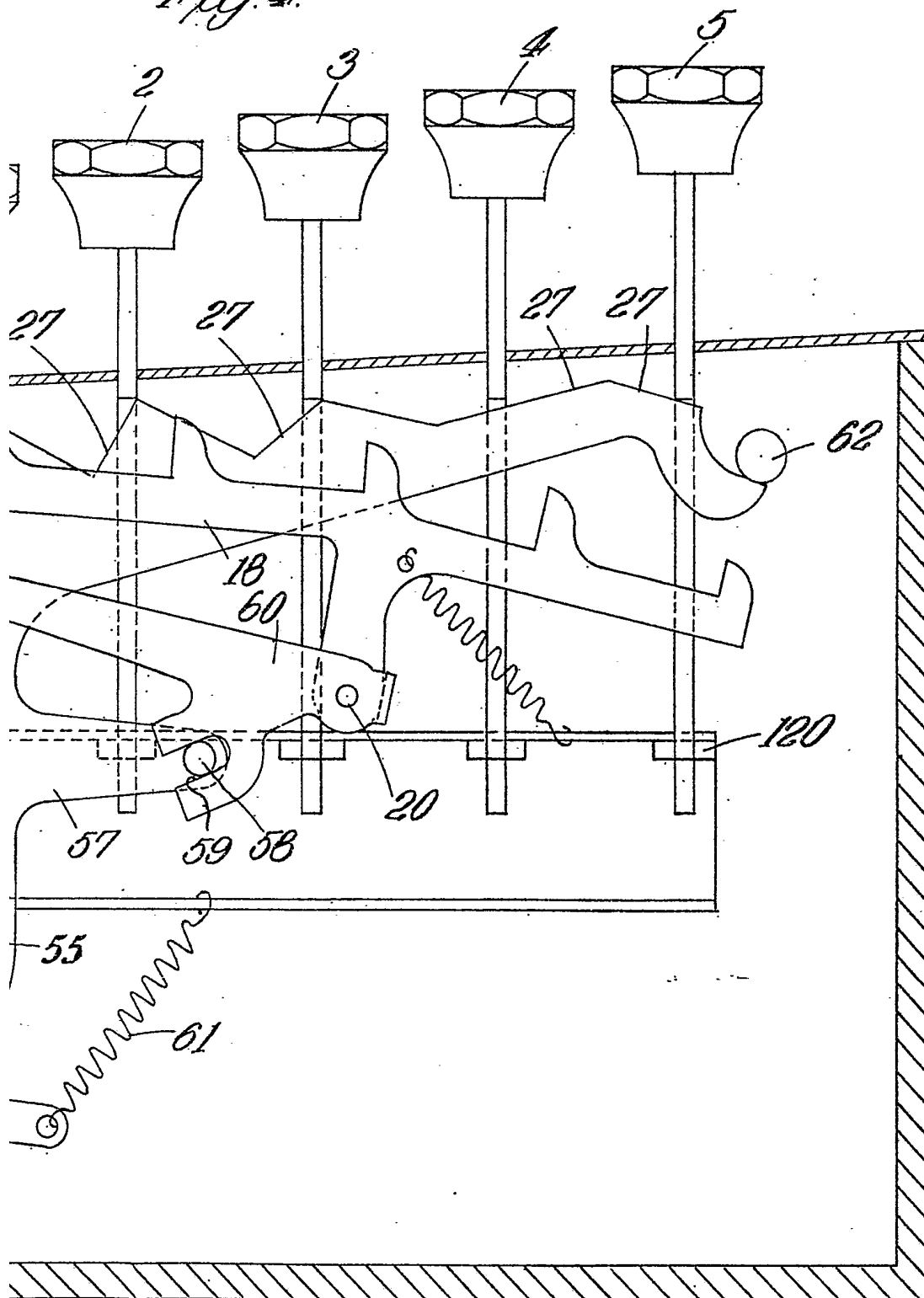
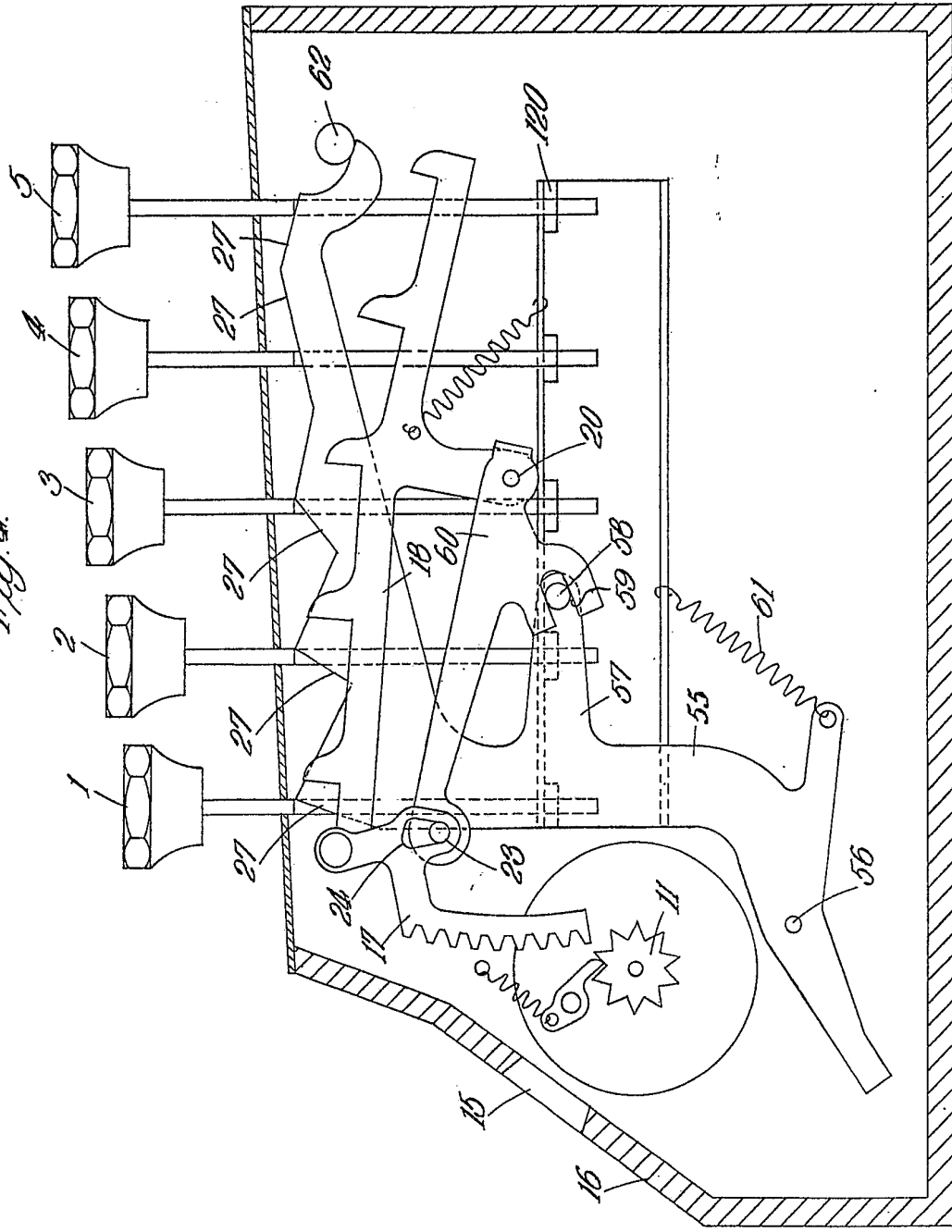


FIG. 4.



[This Drawing is a full-size reproduction of the Original]

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

Fig. 5

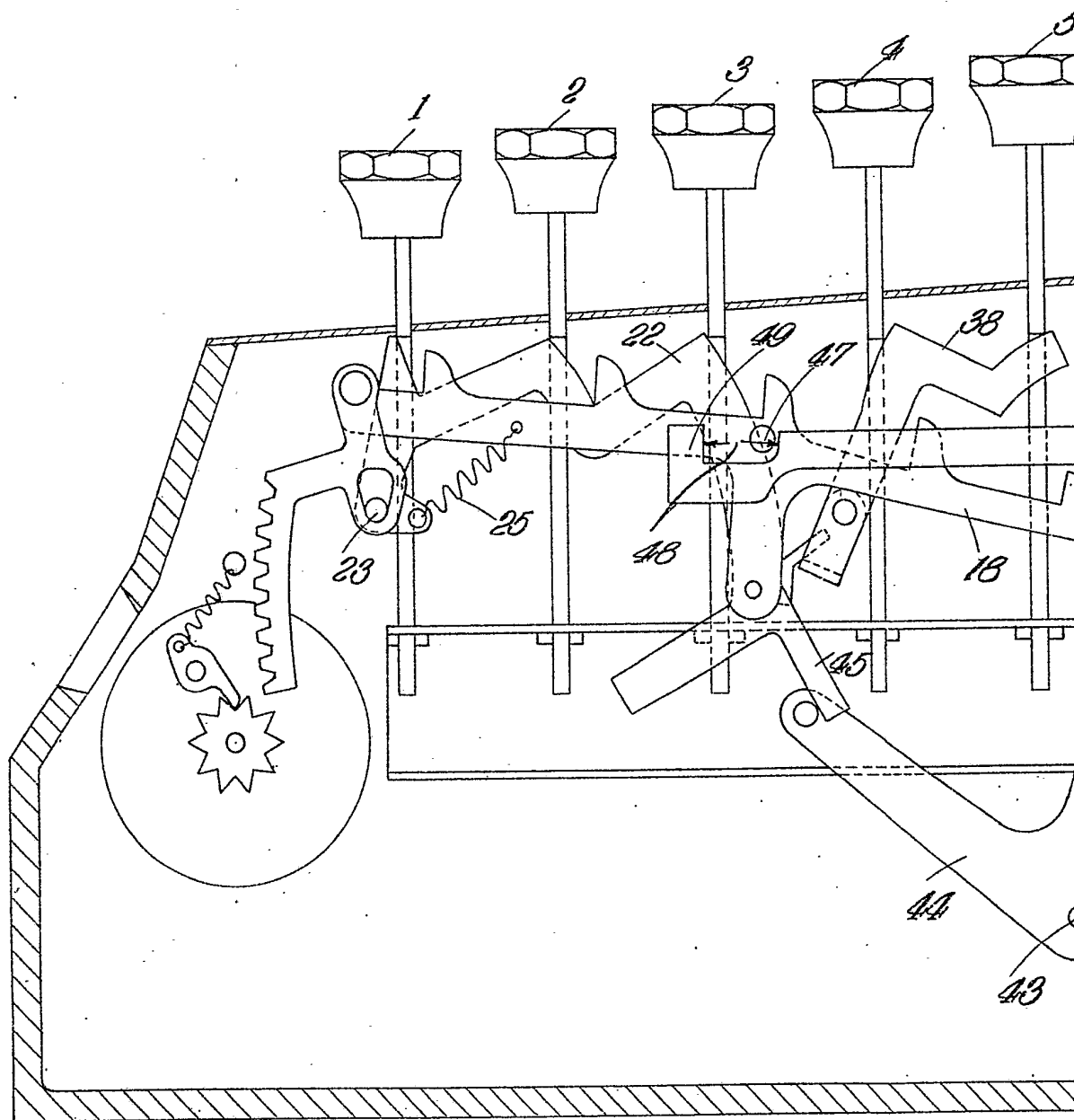


Fig. 5

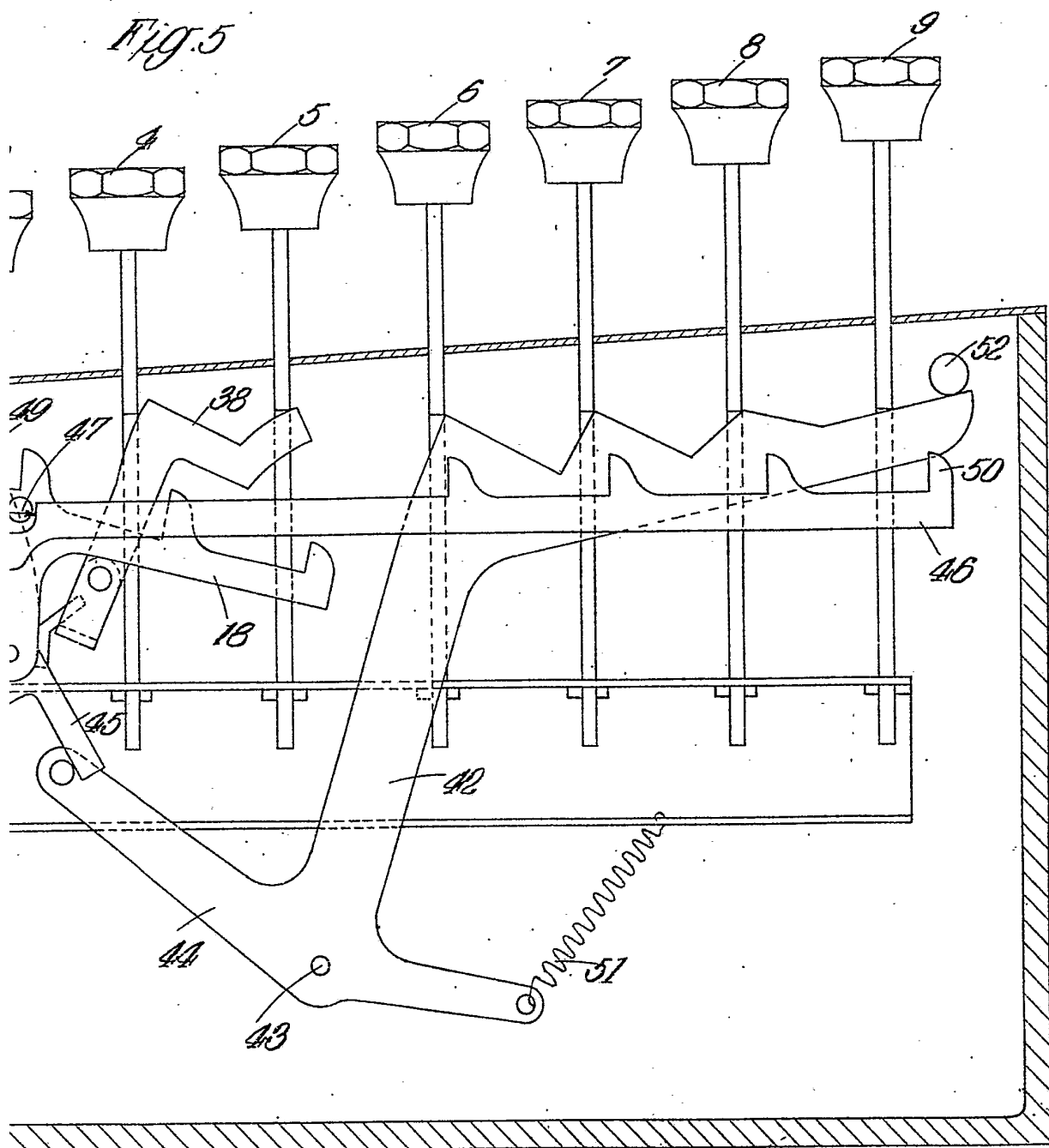
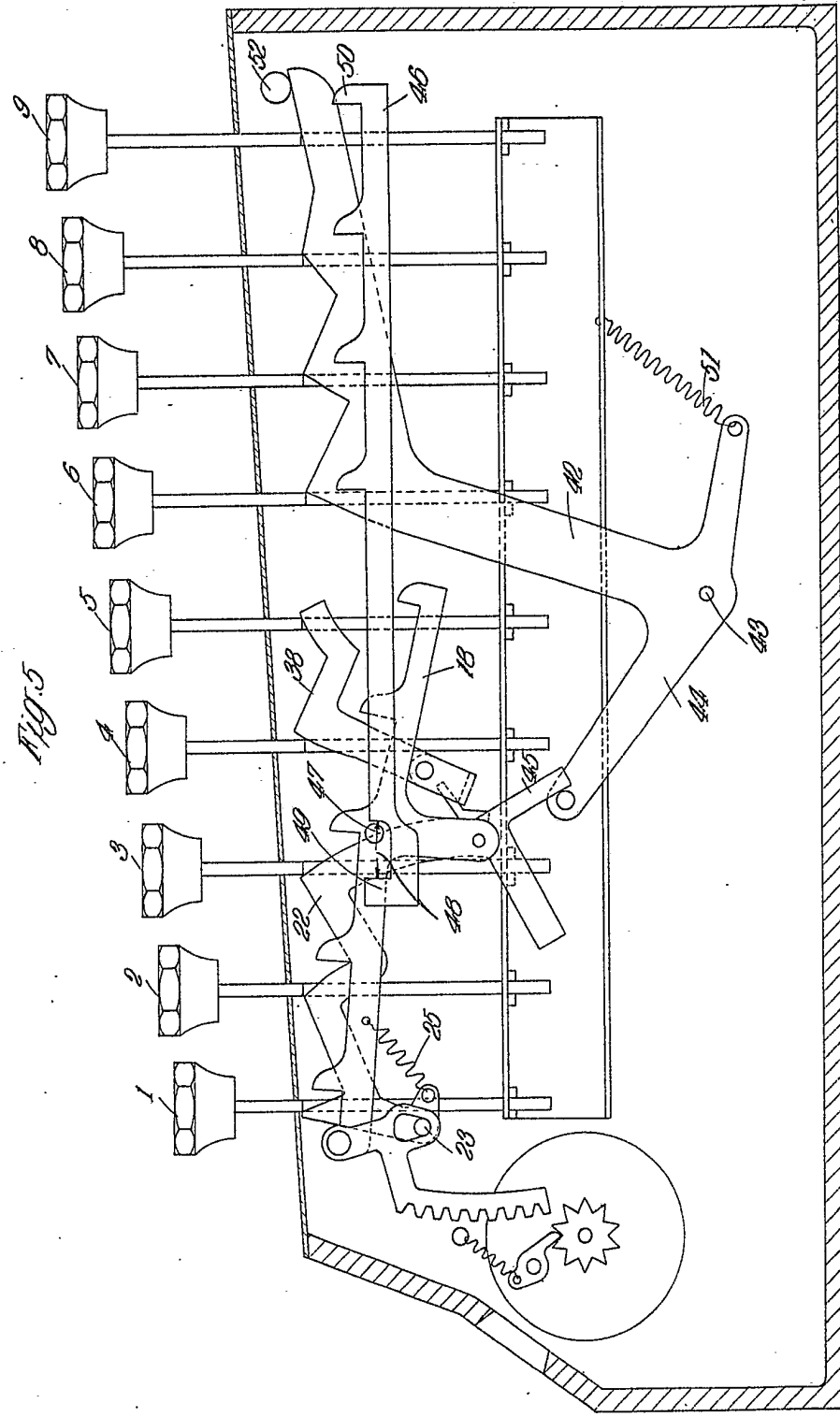


Fig. 5



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

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

Fig. 6.

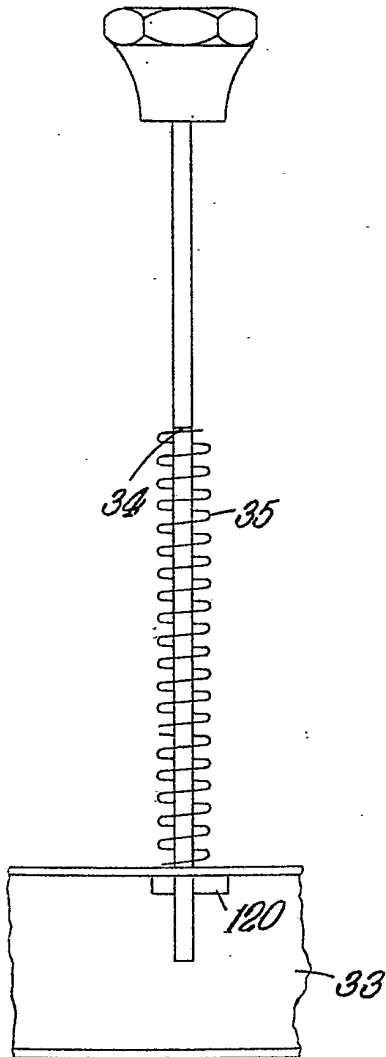


Fig. 7.

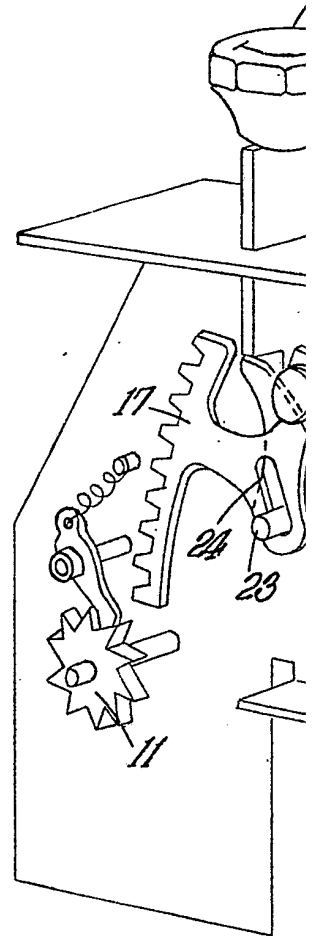
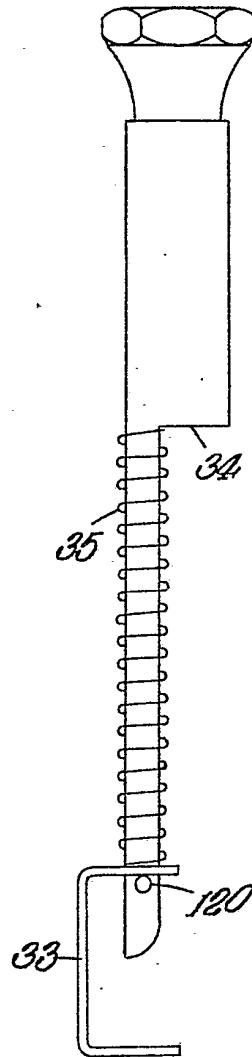
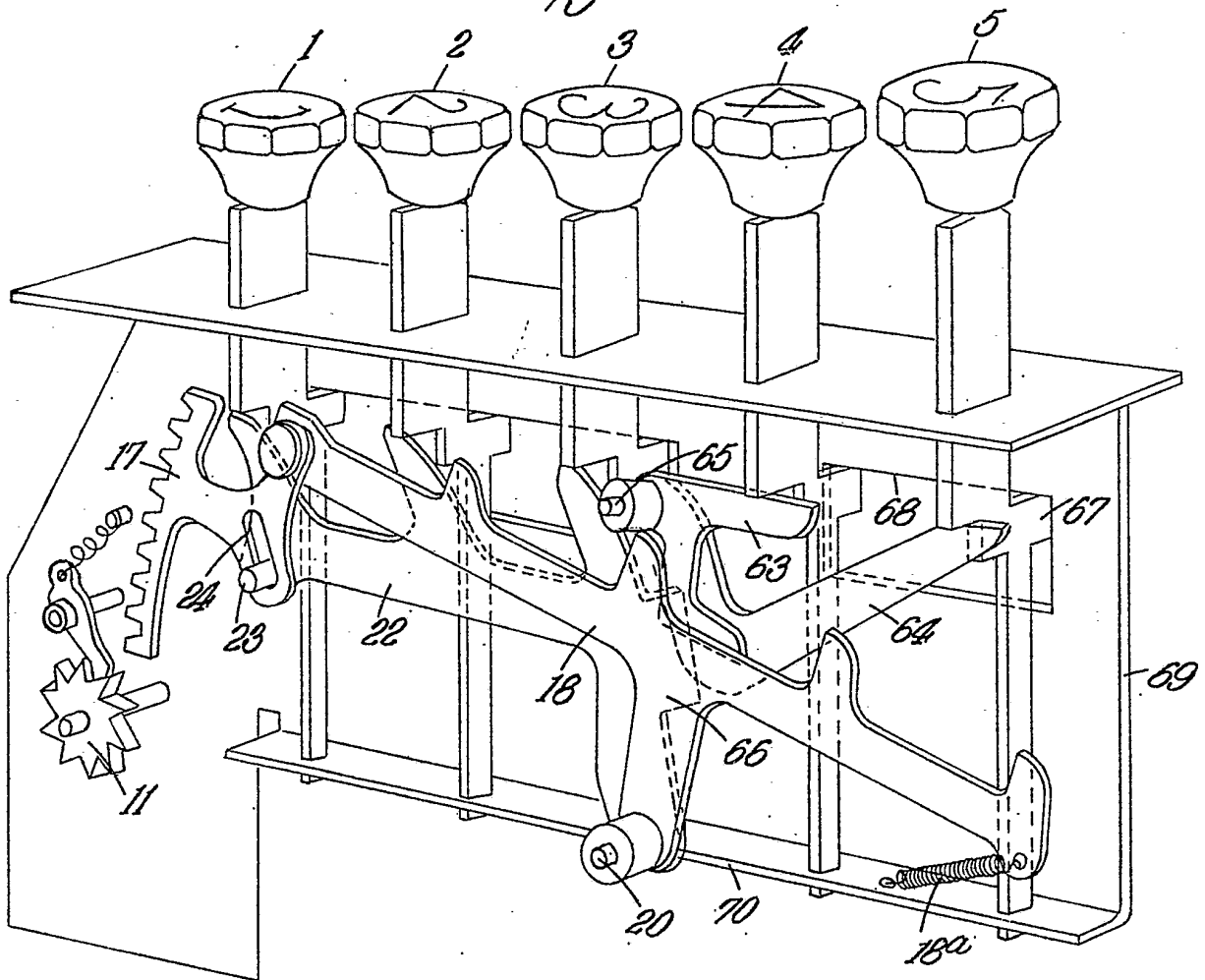


Fig. 8.



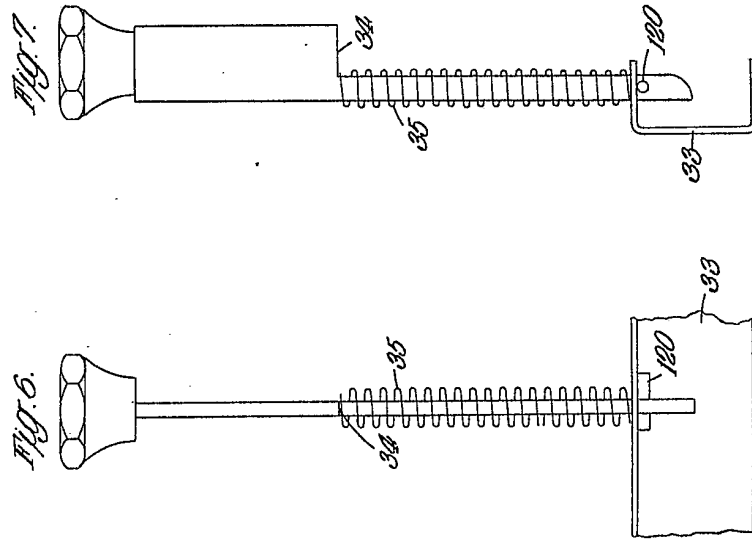
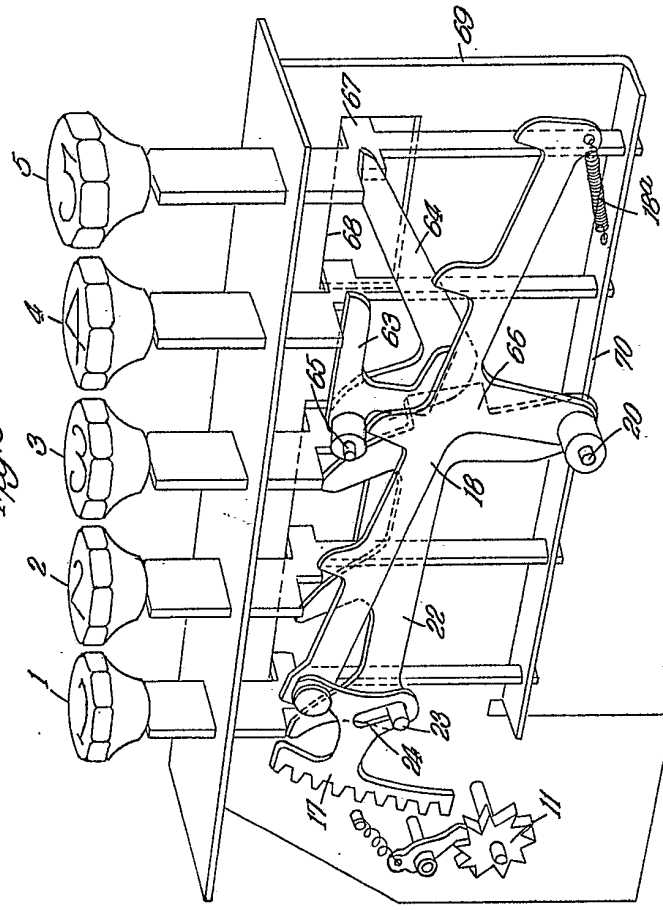


Fig. 8.



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