

(No Model.)

4 Sheets—Sheet 1.

L. S. BURRIDGE.
TYPE WRITING MACHINE.

No. 585,838.

Patented July 6, 1897.

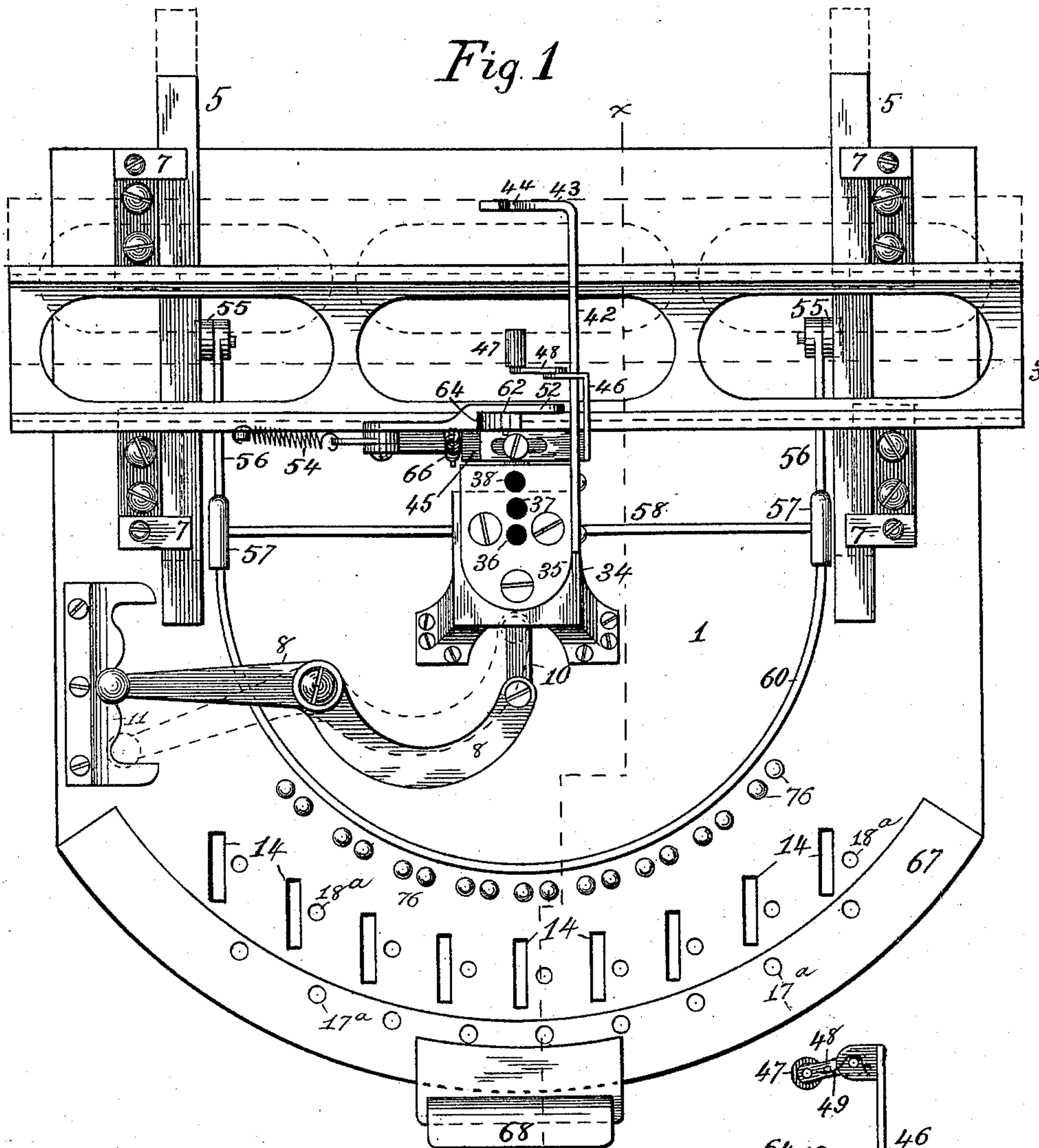
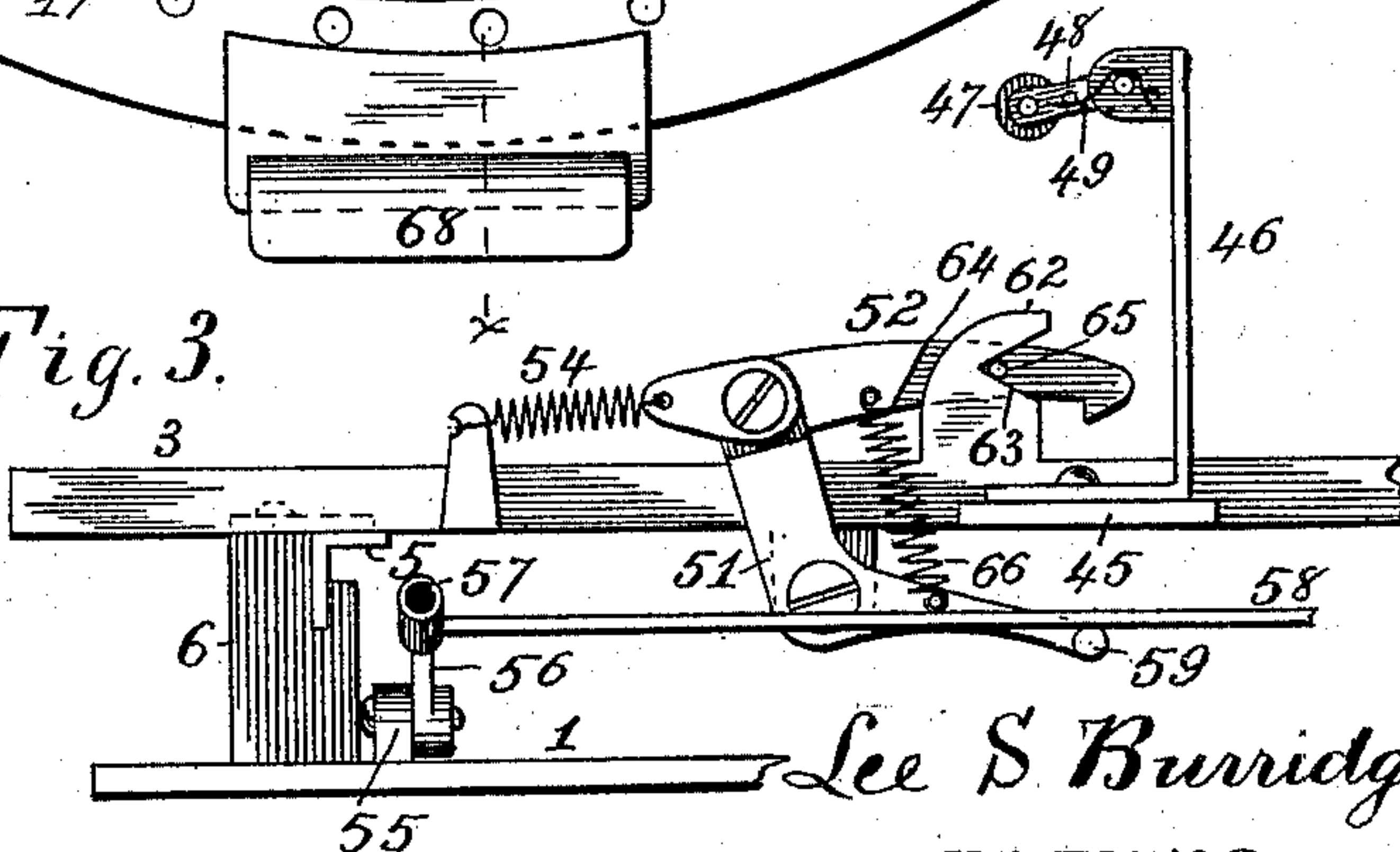


Fig. 3.



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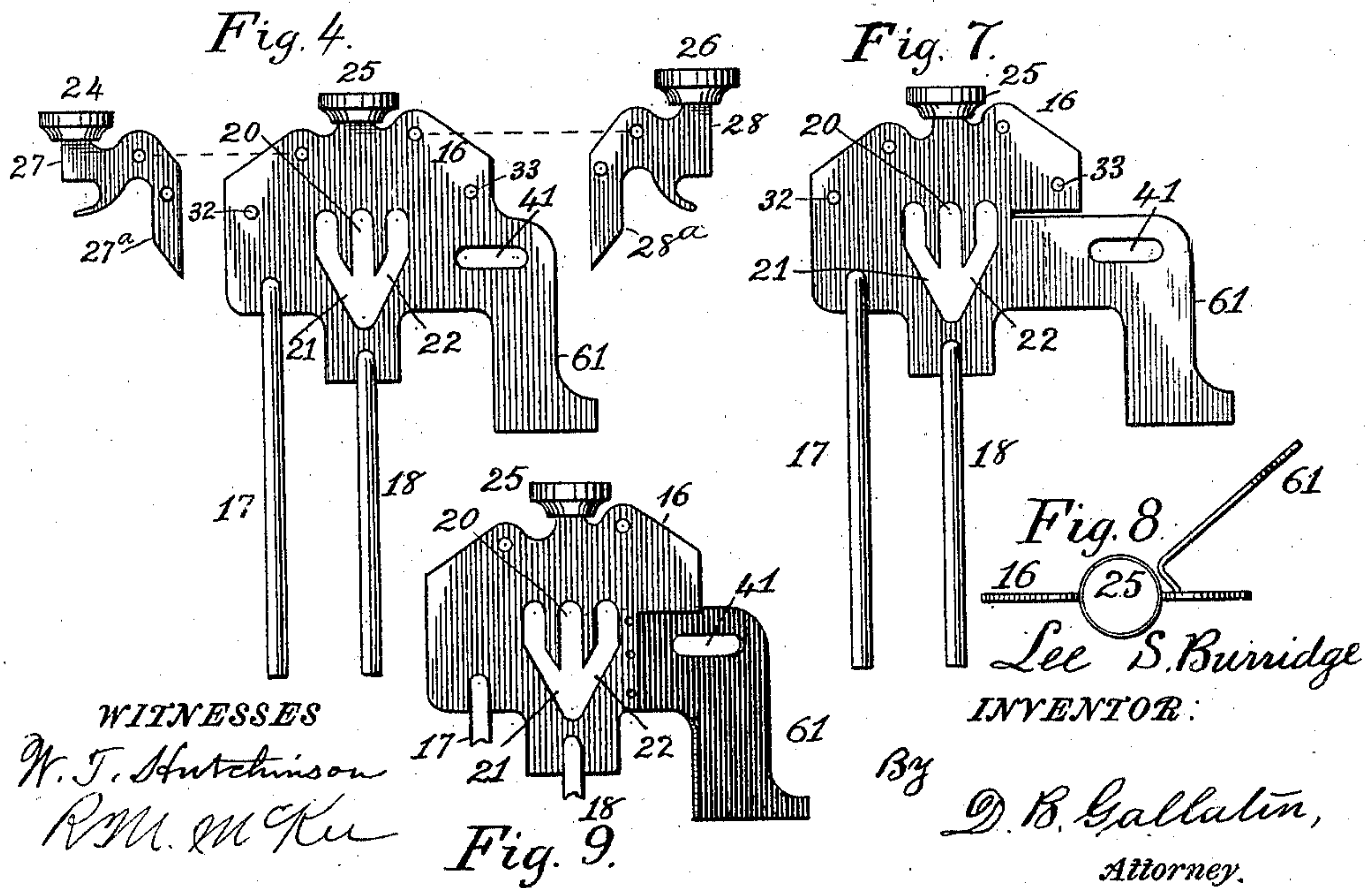
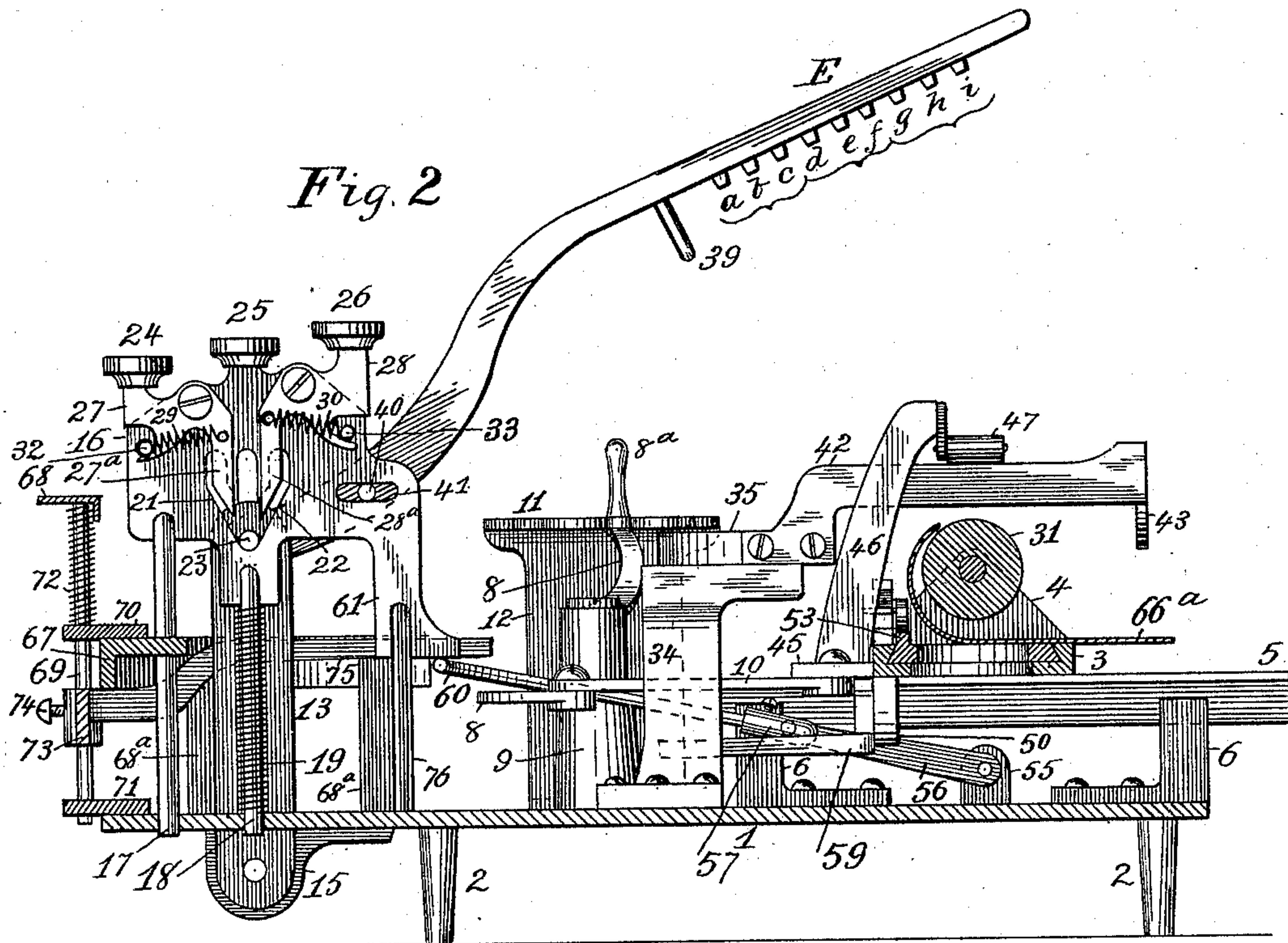
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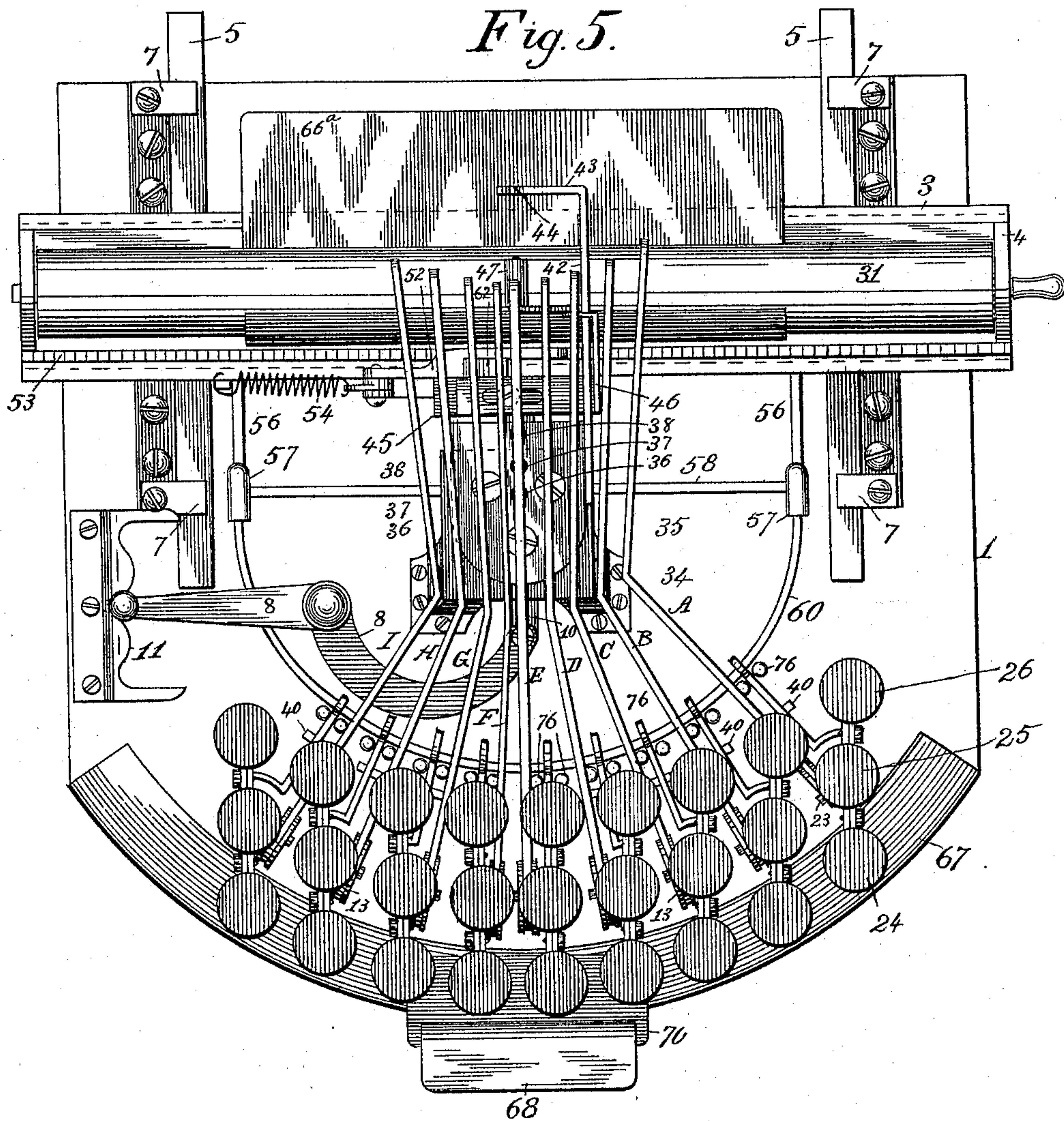
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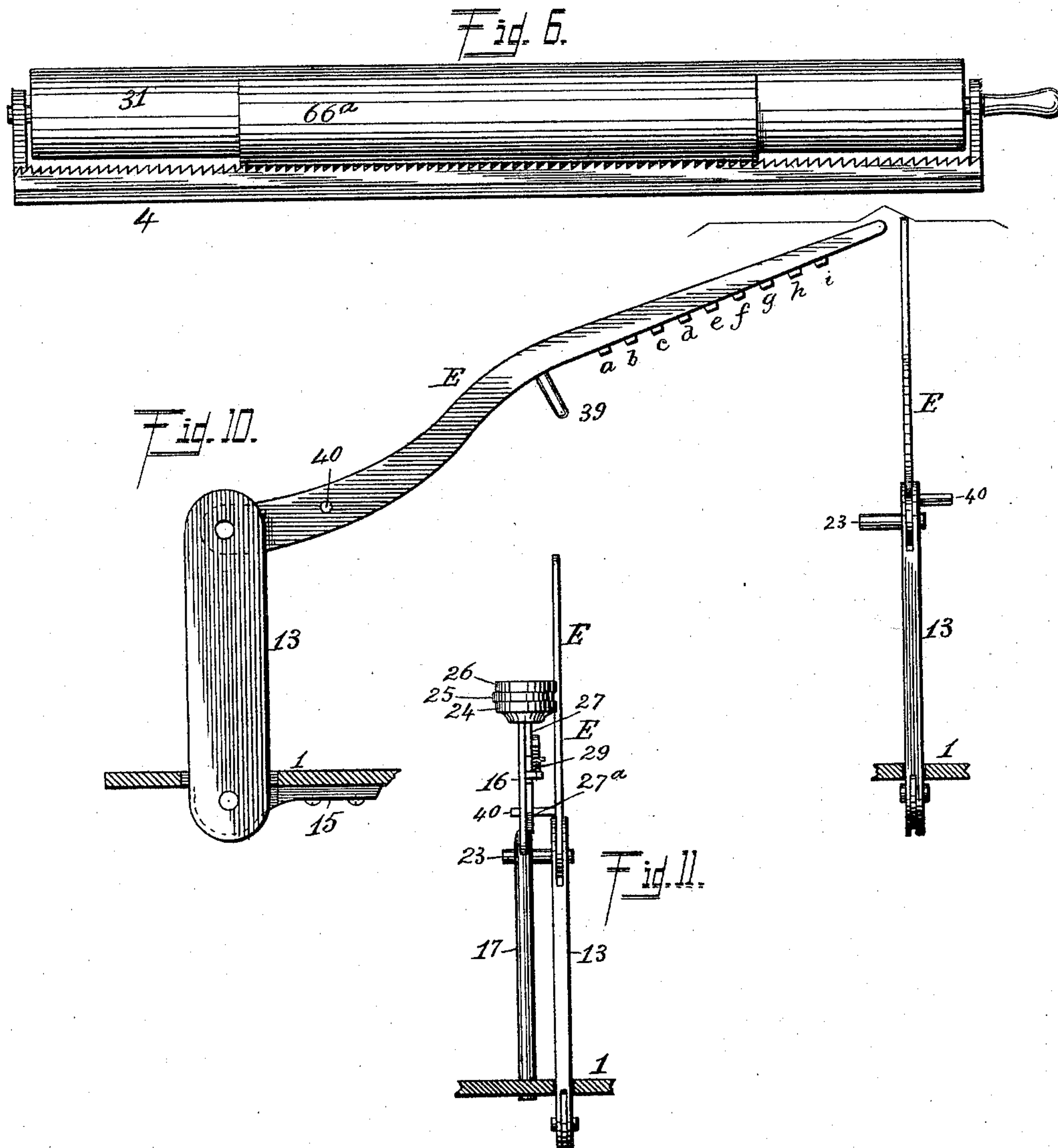
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UNITED STATES PATENT OFFICE.

LEE S. BURRIDGE, OF NEW YORK, N. Y., ASSIGNOR TO THE CENTURY MACHINE COMPANY, OF SAME PLACE.

TYPE-WRITING MACHINE.

SPECIFICATION forming part of Letters Patent No. 585,838, dated July 6, 1897.

Application filed October 31, 1896. Serial No. 610,715. (No model.)

To all whom it may concern:

Be it known that I, LEE S. BURRIDGE, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Type-Writing Machines; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

This invention pertains to that class of type-writing machines in which the type are carried upon bars or levers arranged to swing upon pivots and to carry their type or printing-characters to a common point of impingement or impression; and my object is to improve and simplify the construction and to provide an inexpensive machine having capacity for a large range of work.

In the accompanying drawings, Figure 1 is a plan view of the bed or base of the machine with the carriage-bed, the means for shifting the latter back and forth, and the carriage-moving mechanism, the carriage being omitted. Fig. 2 is a vertical section on the line *xx* in Fig. 1. Fig. 3 is a broken front view of the carriage-bed and carriage-moving mechanism. Fig. 4 is a side view of one of the key-plates and its switches, the latter being shown detached. Fig. 5 is a plan view of the machine complete. Fig. 6 is a front view of the carriage. Figs. 7, 8, and 9 are detail views, which will be fully understood from the following description. Fig. 10 shows in side and front elevations one of the type-levers and the swinging arm or standard on which it is pivoted; and Fig. 11 is a front view of a type-lever, its swinging arm or standard, and the key-plate by which the type-lever is actuated.

Referring to the drawings, 1 designates the base of the machine, the same consisting of a flat plate, preferably rounded at its front end (the end toward the operator being referred to as the "front") and provided on its under side with legs 2, which sustain it somewhat above its table or support.

3 designates the carriage-bed, extending transversely across the machine near the rear thereof and sustained above the base by longitudinally-extending rails 5 5, which are mounted on the tops of posts or standards 6.

The carriage-bed comprises a flat plate or frame having formed in the upper surface thereof a dovetail groove or channel (see Fig. 2) which receives and in which slides the dovetail base of the carriage 4.

The rails 5 are preferably made of angle-bars, (see Fig. 3,) one edge or flange being set loosely into grooves or notches formed therefor in the tops of the posts 6, and they are retained therein by cap-pieces 7.

The carriage-bed is attached to the rails, and the latter are movable longitudinally to permit the shifting back and forth of the carriage-bed and carriage, as indicated by broken lines in Fig. 1, the shifting being effected by a lever 8, mounted on a post 9 and connected with the carriage-bed by a coupling-bar 10.

The outer end of the lever 8, which is provided with a handle 8^a, whereby it is operated, is engaged by a notched plate 11, mounted or formed on a spring-standard 12, which rises from the base 1. The plate 11 has three notches for holding the lever in any one of three positions, from which it will be understood that the carriage-bed is movable back and forth to and from three different positions. The central position is indicated by full lines in Fig. 1.

The machine, as illustrated in the drawings, has nine type levers or bars A, B, C, D, E, F, G, H, and I, though a greater or less number may be used, according to the range of work for which the machine is intended or the number of characters to be employed. These type-levers are pivoted to the upper ends of swinging or vibrating arms or standards 13, which extend through openings or slots 14 in the base 1 and are pivoted at their lower ends to brackets 15, secured to the under side of the base.

The arms or standards 13 are arranged in the arc of a circle the center of which coincides approximately with the center of the base, and they are capable of swinging or vibrating back and forth to a limited extent, their pivotal axes being parallel to the car-

riage-bed, so that the direction of movement is at right angles to said bed, under the arrangement indicated in Fig. 1. The arms or standards 13 may, however, have their pivot axes perpendicular to lines radiating from a common center, as indicated in Fig. 5. The shape of the type bars or levers will of course be varied according to the arrangement of the pivot axes of the arms or standards 13 and the consequent planes or lines of movement of these standards, being in all cases such that each type or character of every bar shall, when the bar is thrown toward the platen, have a common printing-point or center of impingement.

At the side of each standard 13 is a vertically-movable key-plate 16, provided with guide-rods 17 18, which project through openings 17^a 18^a, provided therefor in the base 1, the said key-plates being normally held up by springs 19, coiled around the guide-rods 18. These key-plates are formed with vertical slots 20 and with inclined slots 21 22, extending outwardly and upwardly from the lower end of the slot 20, the said slots 20 21 22 forming an opening V-shaped at the bottom and divided into three branches at the top, as shown in Fig. 4. The pivots 23, which connect the type-levers A B, &c., with the arms or standards 13, project laterally into these openings and serve to limit the rising movements of the key-plates. They also serve as a means for vibrating the arms or standards, as will be explained presently.

Each key-plate is provided with three finger-keys or buttons 24 25 26, the middle buttons 25 being rigidly mounted thereon, while the front and rear buttons 24 26 are mounted on separate plates 27 28, which I denominate "switch-plates" and which are pivoted to the main plate at the top thereof in such relation to each other and to the slot 20 that their depending arms 27^a 28^a when in normal position extend down at the sides of the slot 20, overlying and closing the slots 21 22, as shown in Fig. 2, in which position they are yieldingly held by springs 29 30.

When the key-plates are pressed down by pressure applied to the middle buttons 25, the pins 23 remain in the slots 20 and the arms 13 remain stationary in vertical position, but if either of the buttons 24 26 be pressed down the switch-plate on which it is mounted will first rock on its pivot to open the side slot controlled thereby, after which the key-plate will be depressed, the pin 23 entering the open slot, whereby the arm 13 and its type-lever will be thrown forward or backward, according as the front or the rear button is pressed.

Each type-lever is provided with a laterally-projecting pin 40, which works in a horizontal slot 41, formed in the adjacent key-plate, whereby vertical movements are imparted to the type-levers by the operation of the key-plates.

Under the construction and arrangement

shown each type-lever has on its under side toward the rear end nine types, marked, respectively, "a," "b," "c," "d," "e," "f," "g," "h," and "i," which constitute three groups of three letters or characters each, the middle types of the respective groups being located to correspond to the three positions to which the platen or impression-cylinder 31 is adapted to be set by shifting the carriage-bed, as above explained, while the other types are spaced to correspond with the forward and backward movements of the type-levers under the operation of the switches 27^a 28^a. Thus when the carriage-bed stands in its central position (indicated by full lines in Fig. 1) the platen or impression-cylinder 31 is in position to receive the impact of any of the types "d" "e" "f" constituting the middle group, according to which of the three buttons 24 25 26 is pressed, while in the rearward position (indicated by broken lines) it may receive the impact of the three letters "g" "h" "i" and in the forward position that of the letters "a" "b" "c." The carriage-bed, carriage, and platen then standing in either of the three positions, the middle letter of the group corresponding to that position is brought into action by pressing the middle button or finger-key 25, and the other two types of the group by pressing the buttons 24 26. It will thus be seen that each key-plate controls nine types and that the machine with nine type-levers, each carrying nine types, is adapted to print eighty-one different characters, giving ample capacity for any necessary or desirable range of work.

The switch-plates 27 28 are notched in their outer edges, (see Figs. 2 and 4,) said notches embracing pins 32 33, which project from the main key-plates 16 and which limit the rocking movements of said plates.

Mounted on a stand 34, rising from the center of the base 1, is a table 35, toward which the type-levers A B, &c., converge, as shown in Fig. 5. This table has three holes 36 37 38 arranged in a central line running from front to rear for the reception of guide-pins 39, projecting from the undersides of the type-levers, said openings corresponding to the three positions of said levers. These guide-pins and holes are for the purpose of producing perfect alinement of the letters in writing. When the button 25 is pressed, the type-lever remains in its normal position—that is, with respect to forward and backward movement—and the pin 39 enters the middle hole 37. If the button 24 be pressed, the type-lever will move forward toward the operator, and the pin 39 will enter the hole 36, while if the button 26 be pressed the type-lever will move backward and the pin will enter the rear hole 38. With ordinarily accurate construction these guiding and centering devices will be unnecessary and may be dispensed with.

The type-levers at either side of the middle lever are bent outward at the points at which the guide-pins 39 are located, so that when de-

pressed their rear ends, on which the types are arranged, stand in a central position to bring the types thereon to the same line.

Referring to Fig. 5, it will be observed that the angles formed by the front and rear ends of the type-levers A B, &c., gradually increase from either side toward the middle, the middle lever being straight. This is necessary to bring the rear ends of the several levers to a common line when they are depressed, for it will be perceived that by reason of the convergence of the front ends the angles—that is, the points at which the levers are bent—will be at the center 37 when the levers are depressed and that when the levers rise the angles of the several levers will move upward and outward from the center in radial curved lines, the rear or type-carrying ends being thereby thrown apart, the varying angularity causing divergence, as shown, which divergence, of course, increases the higher they are raised.

It will now be understood from the foregoing description that the type-levers as a whole have two separate movements—first, a rising-and-falling movement produced by depressing and releasing the finger-buttons 25; second, a forward-and-backward movement produced by the operation of the switches 27^a 28^a—and that in addition to these two movements the rear or type-carrying ends of all except the middle lever E have a lateral movement from and toward a central line during their rising and falling movements.

An arm 42, secured to the side of the table 35, extends rearward above the platen 31 and carries at its rear end a transversely-extending plate 43, with a notch 44 in its upper edge, which notch is in the central line of the machine and receives the rear ends of the type-levers when the latter are depressed. This is for the purpose of securing accurate and uniform spacing.

At or near the mid-length of the carriage-bed 3, at the front side thereof, is a ledge 45, on which is adjustably secured the foot of a standard 46, which carries at its upper end an inking-roll 47, which stands in the path of the type-levers and inks the type before they reach the paper. The said roll is rotatably mounted on a pintle projecting from a plate 48, which is pivoted to the standard 46 and is yieldingly held in horizontal position by a spring 49.

At the front side of the carriage-bed 3 is a depending lug 50, to which is pivoted an elbow-lever 51, the vertical arm of which carries a hook 52, pivotally mounted thereon, so as to be capable of swinging vertically. This hook engages a rack 53 on the base of the carriage 4 and forms a part of the feeding mechanism for moving the carriage and feeding the paper laterally during the operation of the machine. The hook is actuated by a spring 54 to move the carriage step by step. The means for moving the hook in the opposite direction to engage a new tooth are as

follows: On the base 1 are lugs or short standards 55, to which are pivoted vertically-swinging arms 56 56, having at their free ends sockets 57, united by a rod 58, which overlies the forwardly-bent end 59 of the horizontal arm of the elbow-lever 51. The sockets 57 receive and hold the ends of a bent rod or wire 60, which underlies legs 61, formed on or connected with the key-plates 16, the arrangement being such that when any key-plate is depressed its leg 61 presses down the bent rod or wire 60 and the rod 58, the latter rocking the elbow-lever 51 and moving the hook 52 forward to engage a new tooth of the rack 53. The key-plate being then released, it is thrown up by its spring 19, whereupon the spring 54 actuates the hook to move the carriage.

The carriage-bed 3 has at its front side a vertical arm or standard 62, which has an angular notch 63 in the side or edge toward which the hook 52 moves when actuated by the spring 54 to move the carriage and on the opposite side or edge it is rounded, as shown in Fig. 3. The hook 52 has an offset or shoulder 64 on the side facing the standard 62, the arrangement being such that just before the hook reaches the limit of its forward movement the shoulder strikes the standard and then under the continued forward movement rides up thereon and throws the hooked end out of engagement with the rack 53, leaving the carriage free to be moved back by hand.

The movement of the hook under the influence of the actuating-spring 54 is limited by a pin 65, which enters the notch 63. The notch is deep enough to prevent the hook from being thrown up out of operative position, and its edges are inclined to permit the necessary play as the shoulder 64 rides up on the standard 62 and to permit the hook to be drawn down by a spring 66 into positive engagement with the rack 53.

66^a designates the paper-guide for supporting the paper and for directing it around and holding it to the cylindrical platen 31. This guide comprises a thin sheet of metal secured upon the carriage, the rear edge extending out to support the paper and the front edge bent or curved up around the front side of the platen to guide the paper and hold it close to the platen.

67 designates a curved rail extending around the front of the machine and supported above the base 1 by posts or standards 68^a. The guide-pins 17 pass through this rail, which thus serves to steady and hold the key-plates 16 in proper position.

68 is the spacing-key, sustained on vertically-movable rods 69, extending through guide-plates 70 71, mounted on the rail 67 and on the base 1, the said key being held up normally by springs 72. The two rods 69 are connected by a socketed cross-bar 73, adjustably secured thereon by set-screws 74. Projecting rearwardly from this cross-bar 73 is an arm 75, the end of which overlies the rod 60, so

that when the key 68 is pressed down the hook 52 is operated to move the carriage, as above explained.

To assist in holding the key-plates 16 in proper position and to guide them in their vertical movements, I provide two guide-pins 76 for each plate, these being set in the base 1 at opposite sides of the legs 61, the latter working between said pins.

Fig. 2 shows the middle key-plate and the middle type-lever, these being straight and standing and working in planes parallel to a vertical plane extending centrally through the machine from front to rear.

Referring again to Fig. 5, it will be seen that the three finger-keys or buttons of each key-plate are arranged in a straight line or row and that all the lines or rows are parallel to each other. The smooth and proper working of the machine requires that that part of the key-plates which contains the horizontal slots 41, wherein the pins 40 work, shall lie close alongside of the type-levers, so as to avoid any tendency to twist the latter in depressing them. Since it is impracticable to twist or bend the key-plates to the required shape to meet the conditions referred to, I propose to construct the plates used in connection with the bent type-levers either as shown in Fig. 7 or Fig. 9.

As shown in Fig. 7, the upper part of the plate which carries the finger-keys or buttons 24 25 26 is of the same size and shape as the middle plate shown in Figs. 2 and 4, but the part containing the slot 41 and carrying the leg 61 is extended toward the rear. Then by cutting in horizontally above the slot 41 I am enabled to bend said extended portion so that it will lie close alongside of the type-lever, as shown in plan view in Fig. 8.

As shown in Fig. 9, I form the leg 61 and the portion containing the slot 41 of a separate piece, which is bent to the required shape and then riveted or otherwise firmly secured to the main plate 16.

The above description of the key-plates of course implies that I contemplate making them of sheet metal. Obviously they may be cast in any shape required.

In the drawings I have represented and in the specification I have described the type-bars as arranged to swing downward to the printing-point, and this is the preferred arrangement, but I do not mean to restrict myself to such arrangement. So, too, I have represented the type-bars as pivotally attached to a separate supporting member, a vertically-arranged standard or arm pivoted at its lower end to the main frame of the machine being the form of support indicated; but it is obvious that any support permitting the compound movement described would answer the same purpose and might be substituted without at all departing from the spirit and scope of my invention. So, too, any projection extending from the movable standard or support into the slot of the actuating-slide would

be the equivalent of the pivot pin or axle of the type-bar similarly extended. In these and many other particulars the embodiment of the invention may be varied, as will be understood by skilled mechanics.

I believe myself to be the first to devise a machine in which a type-bar bearing a plurality of type both moves longitudinally and swings about a pivot or axis under the control of several finger-keys or buttons, which serve both to produce and to determine the character and extent of movement of the type-bar.

The invention is to be distinguished from all that class of machines in which a type wheel, segment, or sector is moved in two directions to bring the required type to the printing-point, the printing being then effected by a hammer or striker. It is also to be clearly distinguished from all that class of machines in which the keyboard is bodily moved toward and from the platen or paper-support. In other words, the present invention involves the swinging movement or the longitudinal and swinging movement of each type-bar independently of every other type-bar of the series, so that the labor placed upon the finger-key is merely that necessary to move a single bar and so also that the simple movement of a single key performs either or both operations of swinging the type-bar or of moving it longitudinally and swinging it to cause the proper type to strike at the printing-point. So far as I am aware no one has heretofore conceived or suggested the idea of thus moving one and the same type-bar both longitudinally and about a pivotal axis by a plurality of keys each effecting the requisite movement of the bar and determining precisely what that movement shall be. This feature I design to claim, broadly and generically, in an application filed in my name on the 10th day of March, 1897, Serial No. 626,872, wherein is shown another embodiment of the invention dispensing with key-plates distinct from the type-carrying members.

In another application, filed March 10, 1897, Serial No. 626,873, I have described and claimed, essentially, the same construction as is herein shown, except that swinging or pivoted levers are employed instead of right-line push-plates to carry the finger-keys or buttons. The present application is therefore intended to cover, broadly, the combination of type-bars provided each with a plurality of printing-characters and having the compound movement described with actuating devices of any kind distinct from the type-carrying members and each provided with a plurality of keys to give the requisite movements to one type-carrying member. It will therefore be understood that application Serial No. 626,872 is intended to cover the type-bar or type-carrying member *per se* and that such subject-matter is reserved thereto, while the present one covers the combination there-

with of a separate and distinct actuating member bearing a plurality of finger-keys or buttons.

Having now described my invention, I claim—

1. In a type-writing machine, the combination of a type-lever provided with a plurality of type or printing characters; a movable support to which said type-lever is pivoted; and a plurality of finger-keys or buttons each adapted to act upon said lever and to move the same longitudinally, and also to swing it about its pivot; whereby said lever is caused to print different characters through actuation of the different finger-keys or buttons.

2. The combination in a type-writing machine, of a platen or paper-support; a series of type-levers each provided with a plurality of printing-characters; a series of independently-movable supports to each of which is pivoted one of the type-levers; and a series of finger-keys arranged in groups of two or more, those of each group being adapted and arranged to act upon one and the same type-lever, to move the same longitudinally varying distances, and to swing the same about its pivotal support; whereby each printing-character of every type-lever is carried to and caused to make an impression at a common printing-point.

3. In a type-writing machine, the combination of a platen or paper-support capable of movement at right angles to the length of the line of printing; a type-lever provided with a plurality of printing-characters arranged in groups of two or more; a movable support to which said type-lever is pivoted; and a plurality of finger-keys each adapted to act upon said type-lever and to move the same longitudinally, and also to swing it about its pivot; whereby said type-lever is caused to move longitudinally varying distances, and to swing toward the platen or paper-support to bring one or another printing-character of a given group to the printing-point, and whereby the platen is brought into position to receive the impact of characters of different groups.

4. In combination with a longitudinally-movable type-bar bearing a plurality of printing-characters and having a pivotal axis at or near one end; a key-plate adapted and arranged both to move said bar longitudinally and to swing it about its pivotal axis; and a plurality of finger-keys carried by said plate and adapted each to control the movements of the bar.

5. In a type-writing machine, the combination of a longitudinally-movable type-lever provided with a plurality of printing-characters and having a pivotal axis at or near one end; a key-plate connected with said type-lever and serving to swing it about its pivotal axis; a series of divergent guides in one of said parts adapted to receive a projection from the other of said parts; and a switch carried by the key-plate and serving to de-

termine into which of the guides the projection shall enter; whereby the position of the pivotal axis of the type-lever at the moment of printing is determined.

6. In combination with a longitudinally-movable type-lever provided with a plurality of printing-characters and with a pivot pin or axle at or near one end; a key-plate adapted to press against the type-lever and to swing it about its pivot-pin; a plurality of divergent slots in said key-plate each adapted to receive the pivot-pin of the type-lever; a finger-key applied directly to the key-plate and serving to move the same in line with one of its slots; and a separate finger-key movably supported upon said key-plate and carrying a switch or gate to direct the pivot-pin into a different slot of the key-plate.

7. In combination with the main frame of a type-writing machine, a platen or paper-support; a standard pivotally supported in the main frame and adapted to swing toward and from the platen; a type-lever pivotally supported upon said standard and provided with a plurality of printing-characters; a key-plate movable in a plane parallel with that in which the type-lever swings and having a loose connection with said type-lever; a plurality of divergent slots or ways in said key-plate; a projection extending from the swinging standard into or through the key-plate at the point of convergence of the slots; and a plurality of finger-keys carried by said plate and serving to direct said projection into one or another of the slots according as one or another finger-key is pressed, substantially as and for the purpose set forth.

8. In combination with a swinging type-lever bearing a plurality of printing-characters; a movable member to which said type-lever is pivoted, provided with a lateral projection; a key-plate having a slot in alignment with said projection and other slots divergent therefrom; a finger-key carried by said plate and serving to move the same in alignment with the first-mentioned slot; and separate finger-keys bearing gates or switches each adapted to close the first-mentioned slot and to direct the projection of the movable member into one or another of the divergent slots.

9. In a type-writing machine, the combination of a paper-support; a movable member adapted to support a type-lever; a type-lever pivotally connected with said member and provided with a plurality of printing-characters; a key-plate having a loose connection with and serving to swing said type-lever, and serving also to lock the movable member or to move the same toward or from the platen; and a plurality of finger-keys carried by said plate and arranged to determine the locking or the movement of the member supporting the type-lever according as one or another is pressed, substantially as set forth.

10. In a type-writing machine, a type-lever capable of longitudinal and of swinging move-

ment; a key-plate loosely connected with said type-lever and adapted to effect both the longitudinal and the swinging movement or to produce the swinging movement alone; a plurality of finger-keys carried by said key-plate; and intermediate devices between the finger-keys and the type-lever, whereby the movements of said lever are determined and are made either simple or compound as one or another finger-key is pressed.

11. In a type-writing machine, the combination of a type-lever having a pivot-pin at or near one end; a key-plate provided with a plurality of divergent slots each adapted to receive the pivot-pin of the type-lever, and to hold the same against movement or to move it forward or backward; and a loose connection between said key-plate and type-lever at a point to one side of its pivot-axis, whereby said key-plate is adapted both to swing the type-lever about its pivot and to move the same longitudinally or to hold the same against longitudinal movement, substantially as set forth.

12. In a type-writing machine, the combination of a longitudinally-movable type-lever provided with a pivot at or near one end, and with a plurality of printing-characters at or near its other end; a key-plate having a loose connection with the type-lever and capable of movement in a plane substantially parallel with that in which the type-lever moves; a finger-key carried by said plate and serving to move the same; guides carried by the key-plate and adapted to receive the pivot-pin of the type-bar; switches carried by said plate and serving to direct the pivot-pin into one or another of said guides; and finger-keys also carried by said key-plate and adapted when pressed to actuate said switches and also to move the key-plate and type-lever, substantially as set forth.

13. In a type-writing machine, the combination of a type-lever provided with a plurality of printing-characters and adapted both to move longitudinally and to swing about an axis; a key-plate adapted both to move the type-lever longitudinally and to swing it about its axis or merely to swing it; and a plurality of keys each serving to move the key-plate and to cause or prevent a longitudinal movement of the type-lever.

14. In a type-writer, the combination of a

pivoted standard provided with a lateral projection; a type-lever having its fulcrum in the free or swinging end of said standard; a key-plate having a plurality of finger-keys; and switches controlled by said finger-keys and adapted to be thrown to one or the other side of the projection of the standard to cause said standard to be moved forward or backward.

15. In a type-writing machine, the combination with a main frame and a paper-support; of standards 13 pivotally connected at their lower ends with the main frame; type-levers E provided with a plurality of printing-characters and pivotally connected with the upper ends of said standards; sliding plates 16 provided with slots 20, 21, and 22; projection 23 extending from the standard 13 into the key-plate at the convergence of said slots; rigid key 25 for actuating said key-plate; and pivoted keys 24 and 26 provided with switch-arms 27^a and 28^a respectively, all substantially as shown and described.

16. In combination with the bail or universal bar of a type-writing machine; a series of swinging type-levers each provided with a plurality of printing-characters; movable supports to which said type-levers are pivoted; a series of key-plates each provided with an arm to bear upon the universal bar or bail and with a plurality of slots to receive a projection upon the type-lever support; and a plurality of finger-keys carried by each of said plates and serving both to depress the same and to determine into which of the several slots the projection shall pass.

17. In combination with a longitudinally-swinging type-lever E provided with a plurality of printing-characters and with a projection 23; a key-plate 16 provided with slots 20, 21 and 22; rigid finger-key or button 25 carried by said key-plate; switch-levers 27 and 28 pivotally attached to the key-plate and provided with switch-arms 27^a and 28^a and with buttons 24 and 26; and springs 29 and 30 attached to the switch-arms and serving to hold them normally clear of the slot 20.

In testimony whereof I affix my signature in presence of two witnesses.

LEE S. BURRIDGE.

Witnesses:

EDWARD B. HESS,
N. M. STOUGHTON.