

KEY MECHANISM FOR TYPOGRAPHIC MACHINES.

APPLICATION FILED MAR. 15, 1902. RENEWED MAY 15, 1905.

Patented Feb. 23, 1909.

5 SHEETS—SHEET 1.



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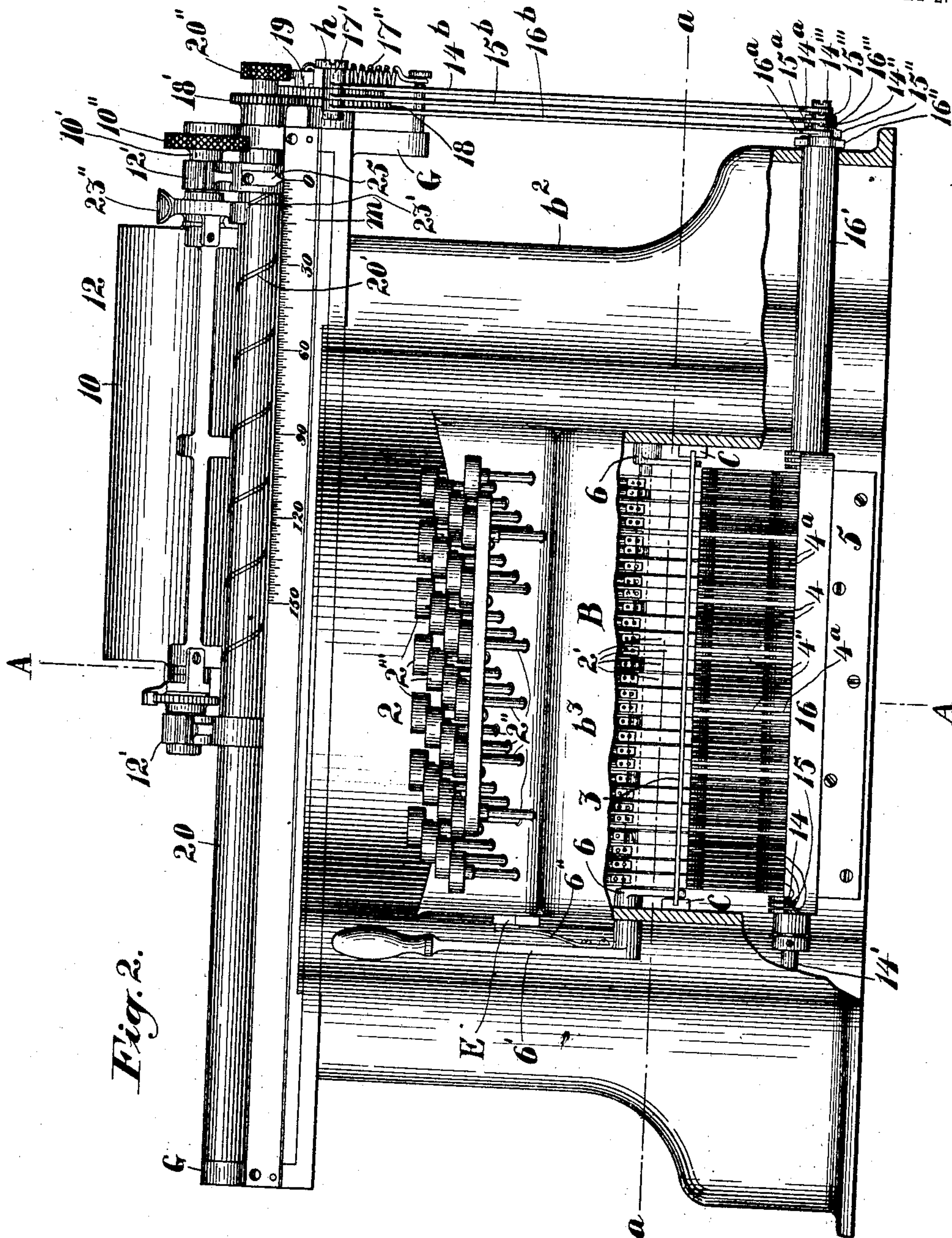


Fig. 2.

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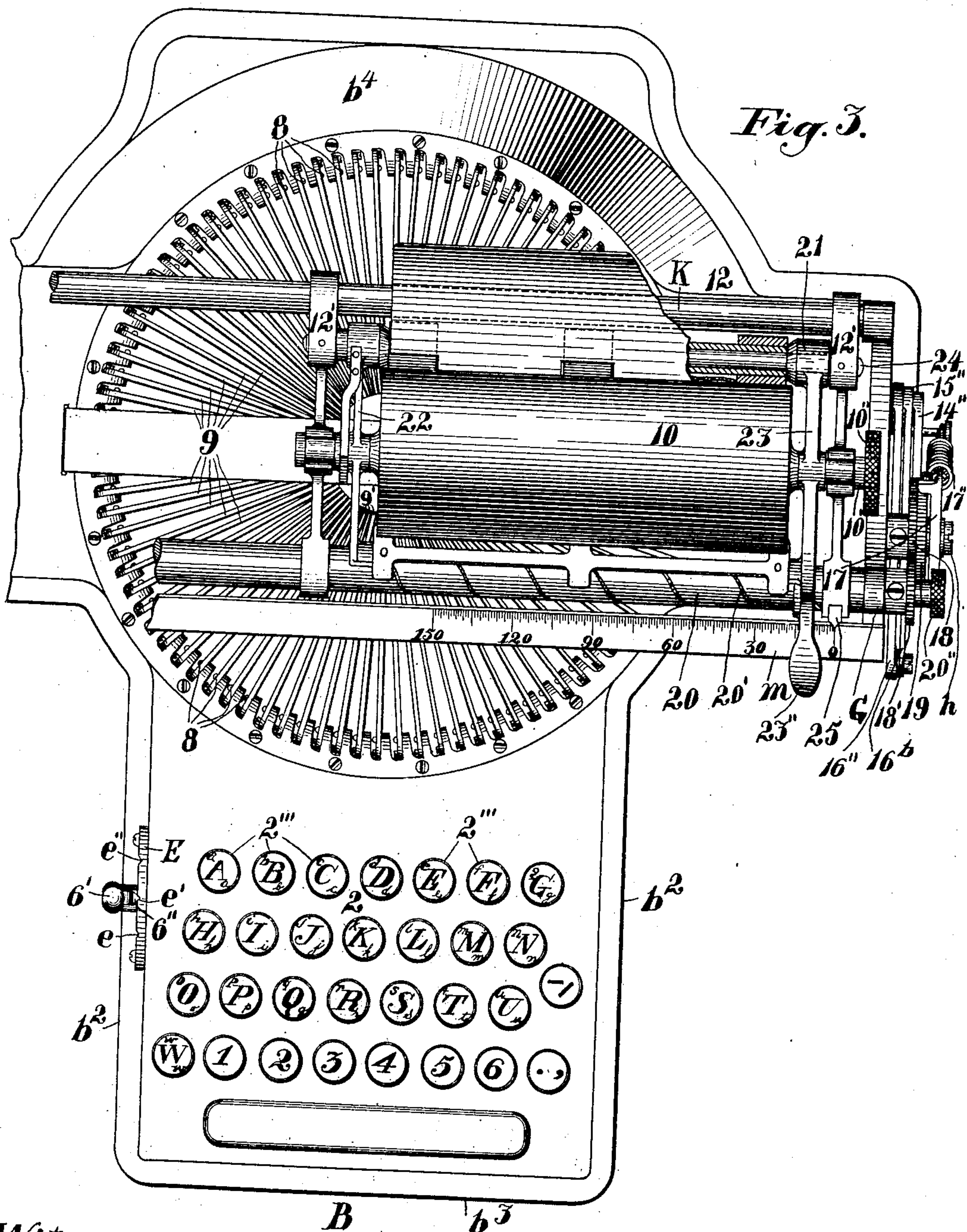
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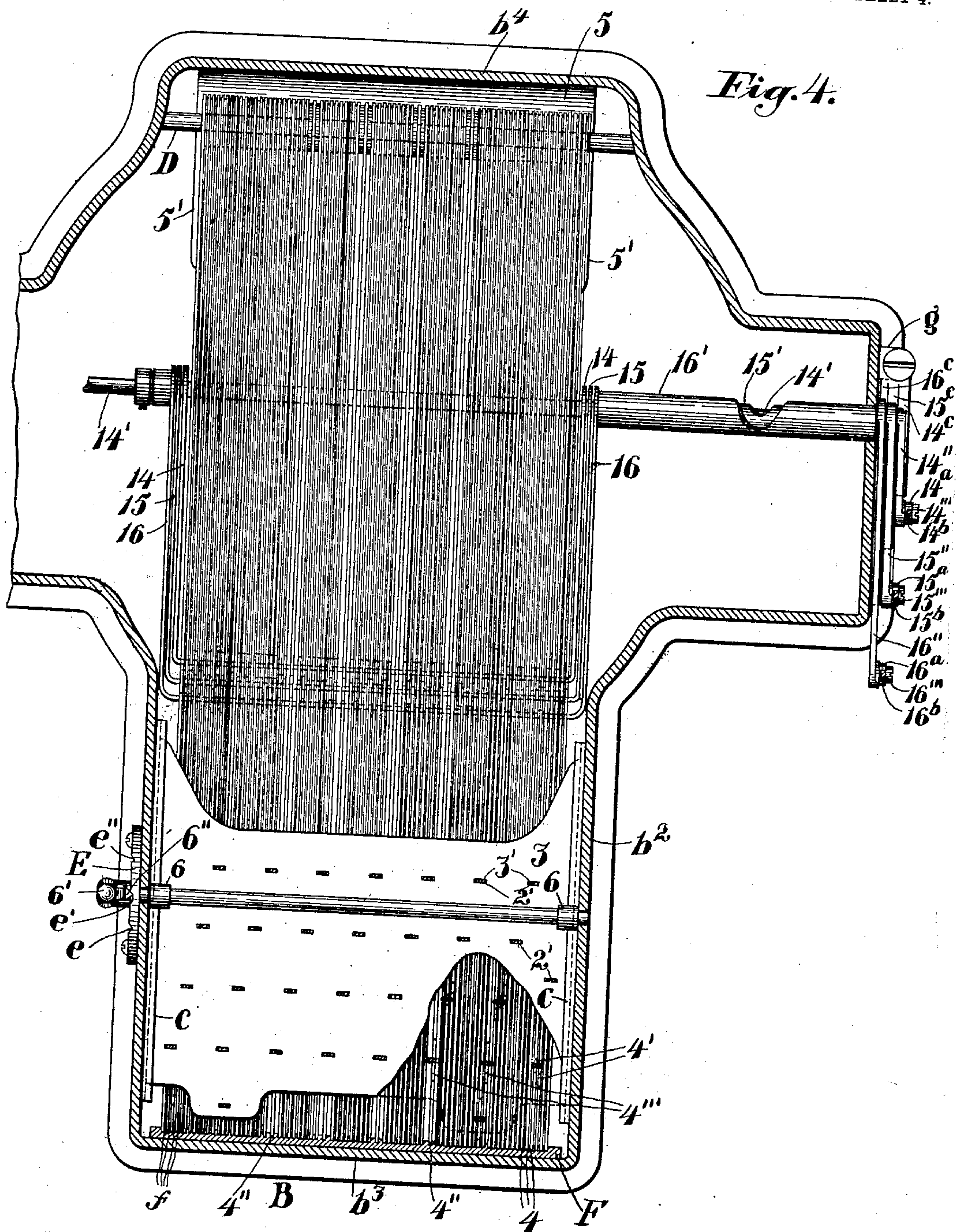
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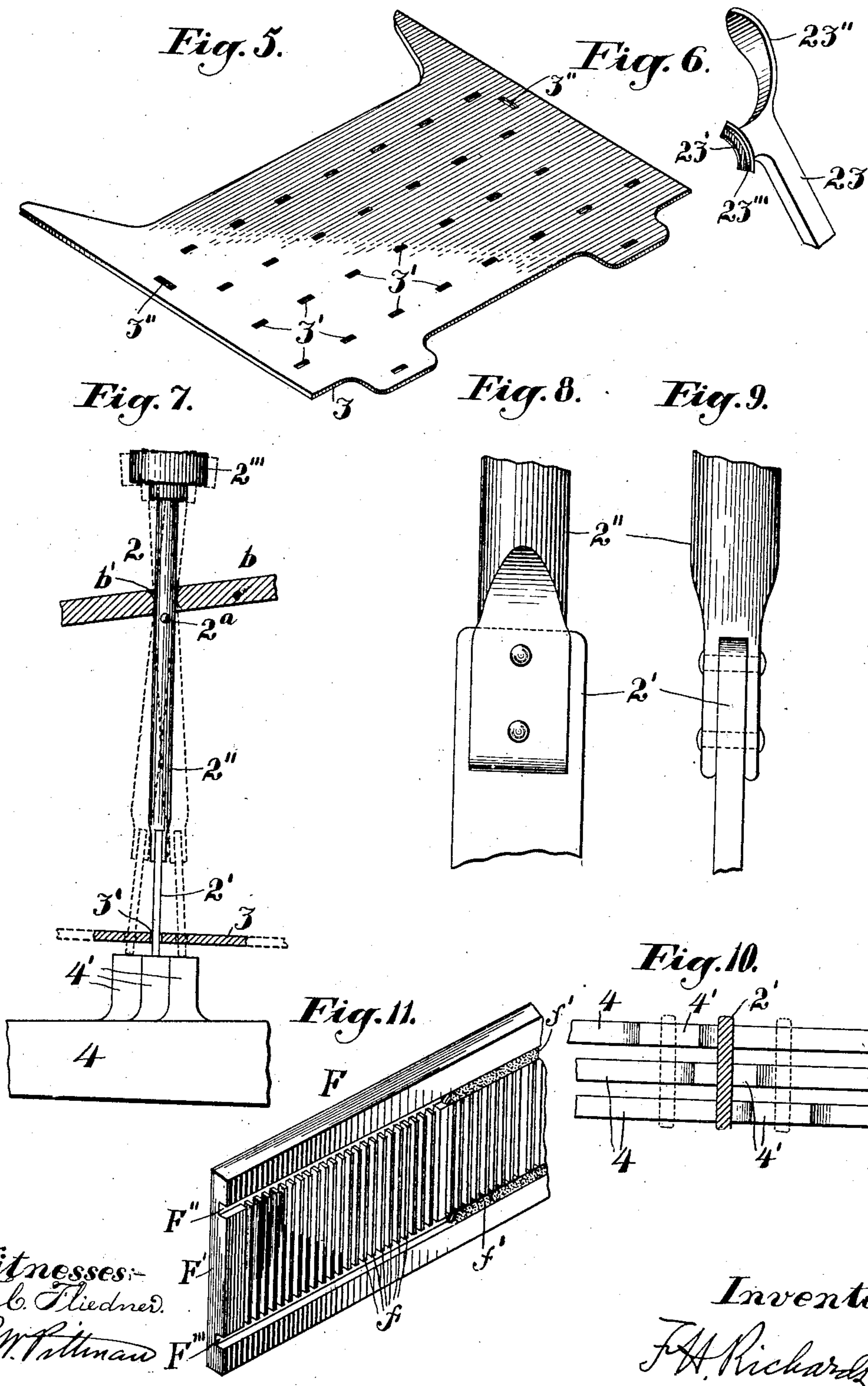
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UNITED STATES PATENT OFFICE.

FRANCIS H. RICHARDS, OF HARTFORD, CONNECTICUT, ASSIGNOR, BY MESNE ASSIGNMENTS,
TO AMERICAN TYPOGRAPHIC CORPORATION, A CORPORATION OF NEW JERSEY.

KEY MECHANISM FOR TYPOGRAPHIC MACHINES.

No. 913,307.

Specification of Letters Patent.

Patented Feb. 23, 1909.

Application filed March 15, 1902, Serial No. 98,285. Renewed May 15, 1905. Serial No. 260,585.

To all whom it may concern:

Be it known that I, FRANCIS H. RICHARDS, a citizen of the United States, residing at Hartford, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Key Mechanism for Typographic Machines, of which the following is a specification.

This invention pertains to the relationship and organization of various elements that may, either singly or collectively, enter into the construction of machines for typographic and other cognate uses; the application, to said elements, of the improvement embodied in this invention, effecting, in part, a combination of elements, whereby any one of a series thereof, such, for instance, as type impressors or impression devices may be selectively operated by a single element, such, for instance, as a key.

In the form chosen herein to illustrate my invention, but which is, in no wise, intended to limit the possible scope of said invention, I have shown a keyboard; a set of shiftable keys; a set of key-levers; connections from the latter, severally, to the respective members of a series of type-bars; the type-bars themselves, each having an impression device; a carriage, with a common form of platen, so-called; and spacing mechanism; some of the elements mentioned being of forms commonly in use and not, in any manner, exclusively appertaining to my invention. By the application of my invention thereto, however, as herein set forth, many of these elements are endowed with new functions, or with new and improved means for performing functions that, in themselves, may not be new. Thus, for instance, the keys are severally capable of operating, by improved means, any one of a plurality of key-levers; the latter, in turn, with their connections, are capable of severally determining the due proportion of space to be allotted to the respective connected impression devices, upon the operation of the latter; the spacing mechanism is capable of furnishing to each, several, impression device, the due proportion of space allotted thereto by the operation of its relative key-lever and connections; and, in other ways, the specific mechanism herein shown and described, illustrates the applicability, to com-

mon devices, of the improvements embodied in my invention. It is quite evident, however, that said improvements may, either severally or collectively, be applied, in an equally efficacious manner, to other elements of the same general class, or to other combinations of the same elements.

The subject matter disclosed herein is closely related to that set forth in my pending application, Serial No. 41,831 filed January 2, 1901. In the present case, however, I employ a shifter plate for transferring a key from operative engagement with one key lever into similar engagement with a different lever, instead of shifting the key bodily, that is, by a translational movement, as in my other pending application.

In the drawings forming a part of this specification, Figure 1 is an elevation of a form of my improvements embodied in a typewriter machine, the mechanism of which is inclosed in a casing shown in section and which is of a conventional form. The case of the machine is shown partly broken away and partly in section on the longitudinal center line A—A, Fig. 2. Fig. 2 is a front elevation of the mechanism shown in Fig. 1. Fig. 3 is a top plan view thereof, a portion of the case at the left being shown broken away. Fig. 4 is a top plan view of a series of key-levers, of a portion of a shiftable plate, and of other members, the case of the machine being partly broken away and partly in section on the lines *a, a*, Figs. 1 and 2, respectively. Fig. 5 is a surface perspective view of a shiftable key-plate. Fig. 6 is a perspective view of the bottom and right side of a spacing arm. Fig. 7 is a side elevation of a key and portions of several key levers; and illustrates various angular positions which may be assumed by the former relative to the latter, respectively. Figs. 8 and 9 are, respectively, front and side elevations of a part of a key. Fig. 10 is a plan of a section of a key and portions of several key-levers, and Fig. 11 is a vertical perspective rear view of a guide bar. References are relatively alike throughout the drawings. The terms "zero," and "zero position," as used herein, indicate a position assumed by an element when prepared for use, but not in use.

In the conventional form of machine

shown in the drawings, the mechanism is partly inclosed within, and partly mounted upon a case B, which may comprise side, front and rear walls, b^2 , b^3 , b^4 respectively, and, in this instance, a key-board b , which is serially perforated to receive the stems of a series of keys 2, each of which comprises a contact piece $2'$, a stem $2''$ and a finger-button $2'''$; the term "key" being generically used herein, and intended to include, not only such members as are shown, but also all manner of cognate devices. The several perforations b' , in the key-board b , may be countersunk, respectively, from each side, as shown; in order to permit the key-stems $2''$, to oscillate therein with but a minimum of lost motion. A shifting-plate 3, is shiftably mounted in grooved guides C; the latter being fixed, respectively, on the interior of each side wall, and adjacent to the front, of the case B. The shifting-plate 3, (see Fig. 5,) is slotted at $3''$ near each end, to receive the respective ends of the shifting levers 6; which, with a hand lever $6'$, are fixed on, and oscillate with, a fulcrum rod 7, which is mounted in bearings, located, respectively, at each side of the case B. On the hand-lever $6'$, may be fixed a spring $6''$; the free end of which may engage in the respective notches e , e' , e'' , formed in a locking plate E, which is fixed to the side of the case B. The shifting plate 3, is serially perforated, to receive the contact-pieces $2'$; the perforations in the plate 3, being so disposed as to be, respectively, at all times, in alinement, considered longitudinally with the machine, with those in the key-board b , but in transverse alinement with the latter, only when the former is practically, in a median position, as shown in Figs. 1 and 7. The perforations $3'$, in the shifting plate, may be beveled from each side, relatively the same, and for the same purpose, as is set forth in relation to the countersunk perforations b' in the key-board b . The contact-pieces $2'$, may consist of flat plates either severally integral with the respective keys 2, or severally joined to the respective key-stems $2''$, in any suitable manner; and their free ends will severally extend across respective groups of key-levers 4; the latter, collectively, forming a series, in which the members are, preferably, arranged face to face, vertically as to cross section, and parallel with each other. The key-levers 4, are pivoted on a common fulcrum rod D, adjacent to the base and to the rear wall of the case B, and the free ends of said levers are engaged by a guiding member, hereinafter described.

The key-levers 4, may be respectively returned to their zero positions by the several teeth $5'$ of a comb-shaped spring member 5, fixed at the rear of the base of the machine. The key-levers 4, may be strips of any

suitable material, with a projection $4'$, secured edgewise on each strip. The projections should all be, practically, on the same horizontal plane; the projections $4'$ being, preferably, of such linear dimensions, and so disposed, that in each group, of three for instance, they will be arranged consecutively adjacent, but slightly overlapped, relative to their positions longitudinally on the key-levers 4, but will severally be on approximately separate planes, transversely with said levers.

The several members of each group of levers, arranged as described, may be operated, respectively and singly, by a single key 2; the contact piece $2'$, of which, as hereinbefore mentioned, extends across the whole particular group of levers. Other key levers $4''$, shown in Fig. 4 as lying separately from the several groups of levers hereinbefore mentioned, may severally have projections $4'''$, thereon, respectively; the linear dimensions of the latter being approximately, equal to the totality of those of each several group of projections $4'$. Hence the key which in any given position is operative to actuate one of these levers $4''$ will remain in operative engagement therewith despite the shifting of the shifter plate. Provision thus exists for enabling a particular key or keys to produce the same result whatever be the position of the shifter plate. Cross-pins 2^a , in the key-stems $2''$, severally contact with the under side of the key-board b , and limit the upward movement of the keys 2, respectively. The guiding member F, hereinbefore referred to, is fixed at the lower part of the inside of the front wall of the case B, and comprises a bar F' , and a plurality of interspaced transverse guiding members f . The bar F' , is grooved longitudinally at F'' and F''' to receive strips f' , of felt or similar non-resonant material.

The operation of any or all of the elements thus far described, may be as here set forth in relation to the respective operations of one group of key levers 4, and of a single lever $4''$, in the order named; the keys 2, collectively, being retained in any certain position by reason of their engagement in the perforations b' , in the key-board b , and $3'$, in the shifting-plate 3, respectively, the latter being locked in a proper relative position by reason of its engagement with the shifting levers 6, which are mounted on and oscillate with the fulcrum rod 7, carrying the hand-lever $6'$, to which is attached the locking spring $6''$, which is engaged in a notch in, and is locked with the locking plate E:—A key 2, being depressed, depresses, in turn, a key-lever 4, whose projection $4'$, lies immediately in contact with the contact piece $2'$ of said key, and whose free end is guided between members f , f' , of the guiding member F; the movement of

the key 2, and key-lever 4, being limited by the non-resonant strip f' , located in the lower groove F''' , in the guiding member F . When the key 2, is released, it, and the lever 4, will be returned to their respective zero positions by a tooth 5', of the spring member 5; the upward movement of the lever 4, being limited by the non-resonant strip f' , in the upper groove F'' , of the guiding member F ; and that of the key 2, by the cross-pin 2^a, in the stem 2'', thereof. By a movement of the hand lever 6', sufficient to cause the spring 6'' to engage in a different notch in the locking plate E , the shifting plate 3, may be shifted and locked; thereby shifting all of the contact-pieces 2', from their former positions and severally contacting all of them with other adjacent key-levers 4, respectively, except as hereinafter noted. Consequently, a depression of the key 2, before operated, will now effect the depression of another key-lever 4, in like manner, as the key-lever formerly mentioned was depressed, and with the same relative results. The relations of the key-levers 4'', with their respective contact-pieces 2', will not, however, be effected by the shifting of the shifting plate 3; as the several projections 4''', on the respective key-levers 4'', and their several correlative contact-pieces 2', will, at all times, exclusively contact with each other; and thus, each key-lever 4'' must, invariably and exclusively, be operated by each and every depression of its correlative key 2. The non-resonant nature of the strips f' , f'' , renders the contact of the key-levers therewith practically noiseless.

It should be noted that the projections on the several key-levers are of sufficient height, relative to the latter, to permit a key to operate any one of the latter without contacting with adjacent key-levers. It should also be noted that the several engagements of the spring 6'', in the notches e , e' , e'' , respectively, effect, by means of the hand-lever 6', fulcrum rod 7, and shifting levers 6, the latter engaging in the slots 3'', in the shifting plate 3, different angular adjustments of the several keys 2, respectively, relative to the several projections 4', on the key levers 4, respectively; and, moreover, by reason of the slight overlapping of the projections 4', on the key levers 4, the shifting thereon of the contact-pieces 2', may be effected smoothly and with less effort than if said projections lay on entirely distinct transverse planes, relatively to the key levers 4; as, by the construction shown, the contact-pieces are, invariably, in contact with a surface which is practically unbroken.

The links 8, connecting the key-levers 4, 4'', to the type-bars 9; the manner of mounting impression devices 9' upon the latter, and of impressing said devices: the annulus

13, receiving said type-bars and maintaining them in their zero positions; the so-called platen 10, and its functional operation, and the carriage 12, are all of conventional forms in the present illustration and need no mention in this specification, further than to say that they are connected and operated in a common and conventional manner. That is to say: when a key-lever 4 or 4'', is operated, the link 8, connecting it with a type-bar 9, causes the latter to oscillate upon its pivot 8', thus bringing the impression device 9', mounted thereon, in contact with, and impressing it upon, material mounted upon the platen 10; which is rotatably mounted in the carriage 12. Upon the return of the type-bar 9, it is received, and rests, within the annulus 13. Line-spacing of the impressed material will, in the present illustration, be effected by rotating a conventional knurled wheel 10'', which is mounted upon and rotates with the spindle 10', of the platen 10.

Besides the projections 4' and 4''', before referred to, other projections, 4^a, are formed upon, or secured to, the levers 4 and 4''; preferably, to the lower edges thereof. The projections 4^a, severally contact with a plurality of levers 14, 15 and 16, herein tentatively shown as three in number. The latter may be of the form of U-shaped universal bars, as shown, partly in dotted lines, in Fig. 4. Contact between the several bars 14, 15, 16, and the projections 4^a, is maintained by springs 14^c, 15^c, 16^c, secured on a bracket g , attached to the side of the case B ; said springs severally impinging against the under sides, respectively, of the arms 14'', 15'', 16'', hereinafter mentioned. The bars 14, 15, 16, are preferably located on a common horizontal plane, beneath the key-levers, and are concentrically and severally attached, at one end to the solid shaft 14', and hollow shafts 15', 16', respectively, each of the shafts being independently oscillatable, relatively to the others; and at the other ends, the bars 14, 15, 16, may severally be pivoted on the shaft 14'. The shaft 16', may be peripherally journaled in the right wall of the case B ; the shaft 15', may be journaled in the shaft 16', and the shaft 14', may be journaled, at one end, in the shaft 15', and at the other end, it may be journaled in the opposite wall of the case B . To these shafts, respectively, are secured the several arms 14'', 15'' and 16''; which oscillate with their respective shafts. Thus, for instance, the universal bar 14, shaft 14', and arm 14'', necessarily oscillate with each other; as, also, do the several connected trains, 15, 15', 15''; and 16, 16', 16''. The arms 14'', 15'', 16'', are severally furnished with pivots 14''', 15''', 16'''', which, severally, engage in the slotted ends 14^a, 15^a, 16^a, of each of the links 14^b, 15^b, 16^b, respectively, all of the latter, at their other ends, having a common pivot 17',

which is fastened in one arm of a double-armed lever 17, which is pivoted on a stud *h*, which is secured to a bracket *G*, which may be integral with the case *B*. The other arm of the lever 17, may be engaged by a helical spring 17'', which by means of the lever 17 and pivot 17', serves to maintain upward contact of the slotted link-ends 14^a, 15^a, 16^a, and the arm-pivots 14''', 15''', 16'''. Also mounted, concentrically, on the stud *h*, are a gear-wheel 18, and a ratchet wheel 19, which rotate together on said stud. A pawl 17''', mounted on the lever 17, operates the ratchet wheel 19, at each returning oscillation of the lever 17. The gear-wheel 18, meshes with a pinion 18', mounted on a shaft 20, which is journaled in brackets *G*, which may be integral with the case *B*. The shaft 20, is helically grooved at 20', in a portion of its length, which may be equal to the longest line of characters which it may be possible for the machine to impress; and the shaft 20, may be provided with a knurled wheel 20'', by which it may be rotated.

The platen spindle 10', is journaled, near each end, in the end members 22, 23, of a frame 21. The member 23, is provided with a face 23'', near its front end, adapted to rest upon, and travel longitudinally on the shaft 20. It is also provided with a projection 23', from the face 23'', adapted to engage in the helical groove 20' in the shaft 20; and also with a finger-piece 23'', by which the frame 21, may be oscillated upon a rod 24, which forms part of the carriage 12; the latter being also provided with cross bars 12', adapted to travel upon the shaft 20, at the front of the machine, and on the guide rod *K*, at the rear of the machine.

The platen spindle 10', may be additionally journaled in open bearings in the cross-bars 12' of the carriage; end-play of the former being prevented by suitable collars or shoulders thereon. The graduated scale *m*, may be immovably mounted on the brackets *G*, and an index 25, mounted on the carriage 12, may be used to indicate the amount of space, longitudinally of a line, allotted to each impression; or a totality of such allotments.

The operation of the members in the character-spacing train of mechanism may be described as follows:—A key lever, either 4 or 4'', being depressed, depresses, in turn, a universal bar; the particular operative connection between the elements mentioned, being defined by the location of the specific projection 4^a, on said key-lever. The depression of the universal bar, (14, 15 or 16,) effects, in turn, by means of its connected shaft, (14', 15' or 16',) a depression of its particular arm, (14'', 15'' or 16'',) which, by means of its pivot (14''', 15''' or 16'''), link, (14^b, 15^b or 16^b,) and the pivot 17', oscillates the lever 17 on the stud *h*. Any arm

14'', 15'' or 16'', may, because of the slots 65 in the link-ends 14^a, 15^a, 16^a, be operated singly and independently of the others. It should be noted, in view of the description, hereinbefore given, of the operation of the impressing mechanism, that at this point in the operation of the character spacing mechanism, the impression of a character will have been effected. Now, therefore, by the operation of the mechanism chosen to illustrate, herein, a method of operating my invention, the operated impression device, having made an impression, becomes disengaged from the impressed material, and, synchronously with its retirement to the annulus 13, the lever 17 returns toward its zero position, effecting, meanwhile, however, by means of the engagement of the pawl 17''', with the teeth of the ratchet wheel 19, a partial rotation of the latter with the connected gear wheel 18; and the latter, in turn, partially rotates the shaft 20, by means of the gear pinion 18', secured thereon. The projection 23', if it be, at the time, engaged in the groove 20', is propelled by the shaft 20, to a predetermined distance, equal to the space required by the impression last made; the difference in the spacing necessary for various impression devices, being provided for by the adaptation of the respective proportionate lengths of the several arms 14'', 15'' and 16'', relatively, to effect such differential spacing; by which means, said arms 14'', 15'' and 16'', severally effect different degrees of motion of the links 14^b, 15^b, 16^b, and the arm 17, pawl 17''', ratchet wheel 19, gear wheel 18, pinion 18', shaft 20, projection 23', arm 23, frame 21 and platen 10; the amount of spacing, thus effected, being equal to the distance which the index 25, moves; as shown by the graduated scale *m*; by which means, also, the totality is shown, of all spaces previously made in any particular line. The return of members to their respective zero positions, is effected by the springs hereinbefore mentioned.

Should the shaft 20, need to be rotatively adjusted in order to properly engage the projection 23', as at the beginning of a line, or at any certain point relative to the longitudinal motion of the carriage 12, such adjustment may be effected by means of the knurled wheel 20''. The platen 10, may be raised by the finger-piece 23'', to permit inspection to be made of impressed material.

Having described my invention, I claim—

1. The combination with a plurality of levers disposed side by side and each having an actuator engaging face, said engaging faces occupying different positions longitudinally of said levers, of an actuator extending transversely of the levers and having a length, measured in such transverse direction, which would enable it to operate

all of the levers at each actuation, and a shifter plate for shifting the actuator lengthwise of the levers to thereby shift it out of coöperative relation with the engaging face or faces of a lever or levers and into such relation with the engaging face or faces of another lever or levers.

2. The combination with a plurality of levers provided with projections extending from one edge of the respective levers, of an actuator extending transversely of the levers and having a length, measured in such transverse direction, which would enable it to operate all of the levers at each actuation, and a shifter plate for shifting the actuator lengthwise of the levers to thereby shift it out of coöperative relation with a projection or projections on one of the levers and into such relation with a projection or projections on another lever or levers.

3. The combination with a plurality of levers disposed side by side and each having an actuator engaging face, said engaging faces occupying different positions longitudinally of said levers, of an actuator extending transversely of the levers and having a length, measured in such transverse direction, which would enable it to operate all of the levers at each actuation, and a shifter plate through which the actuator extends and which is shiftable lengthwise of the levers and is constructed and adapted for shifting the lower end of the actuator out of coöperative relation with the engaging face or faces of a lever or levers and into such relation with the engaging face or faces of another lever or levers.

4. The combination with a plurality of levers, disposed side by side and each having an engaging face, of a push rod for actuating the levers, a foot piece secured to the push rod for engaging said faces and extending transversely over said levers, and a shifter plate through which the foot piece extends and which is located adjacent to the lower end of the rod.

5. The combination of a plurality of groups of key levers, an actuator associated with each group and each adapted to actuate at will a predetermined lever of the group with which it is associated, each actuator extending transversely across all of the levers with which it is associated, a shifter plate through which said actuators extend, and guides for said plate for permitting movement thereof in the direction of the length of the levers.

6. The combination with a plurality of groups of key levers disposed side by side,

of a shifter plate shiftable in the line of length of the levers, a push rod associated with each group of levers, and a foot piece secured to each push rod and extending transversely across all of the levers of the group with which it is associated, said levers having projections with which the foot pieces of the associated push rods are adapted to contact in some position of the shifter plate.

7. The combination with a plurality of levers, of a number of push rods for actuating the same, a shifter plate through which the push rods extend, a hand lever for shifting the shifter plate, and a detent for holding the hand lever in an adjusted position.

8. The combination with a plurality of levers disposed side by side each of said levers having an actuator engaging face, of a vibratory and reciprocatory actuator for the levers, a stop for limiting the upward excursion of said actuator, a foot piece on the actuator and located above said levers, and a shifter plate through which said foot piece extends and which is operative to shift the same out of engagement with one of said actuator engaging faces and into engagement with another.

9. The combination with a plurality of levers, of an actuator extending transversely thereof for actuating the said levers and a shifter plate for shifting the actuator lengthwise of the levers to thereby shift it out of coöperative position with a lever and into such relation with another lever, each of such levers having an engaging face with which the foot piece of the actuator is adapted to engage in some position of the shifter plate.

10. The combination with a plurality of levers disposed side by side and arranged in groups, of an actuator extending transversely of the levers in each group and having a length measured in such transverse direction which will enable it to operate all of the levers in said group at each actuation, and a shifter plate for shifting the actuator lengthwise of the lever to thereby shift it out of coöperative relation with all but one lever and into such relation with such lever, each of such levers having an engaging face with which the foot piece of the actuator is adapted to engage in some position of the shifter plate.

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