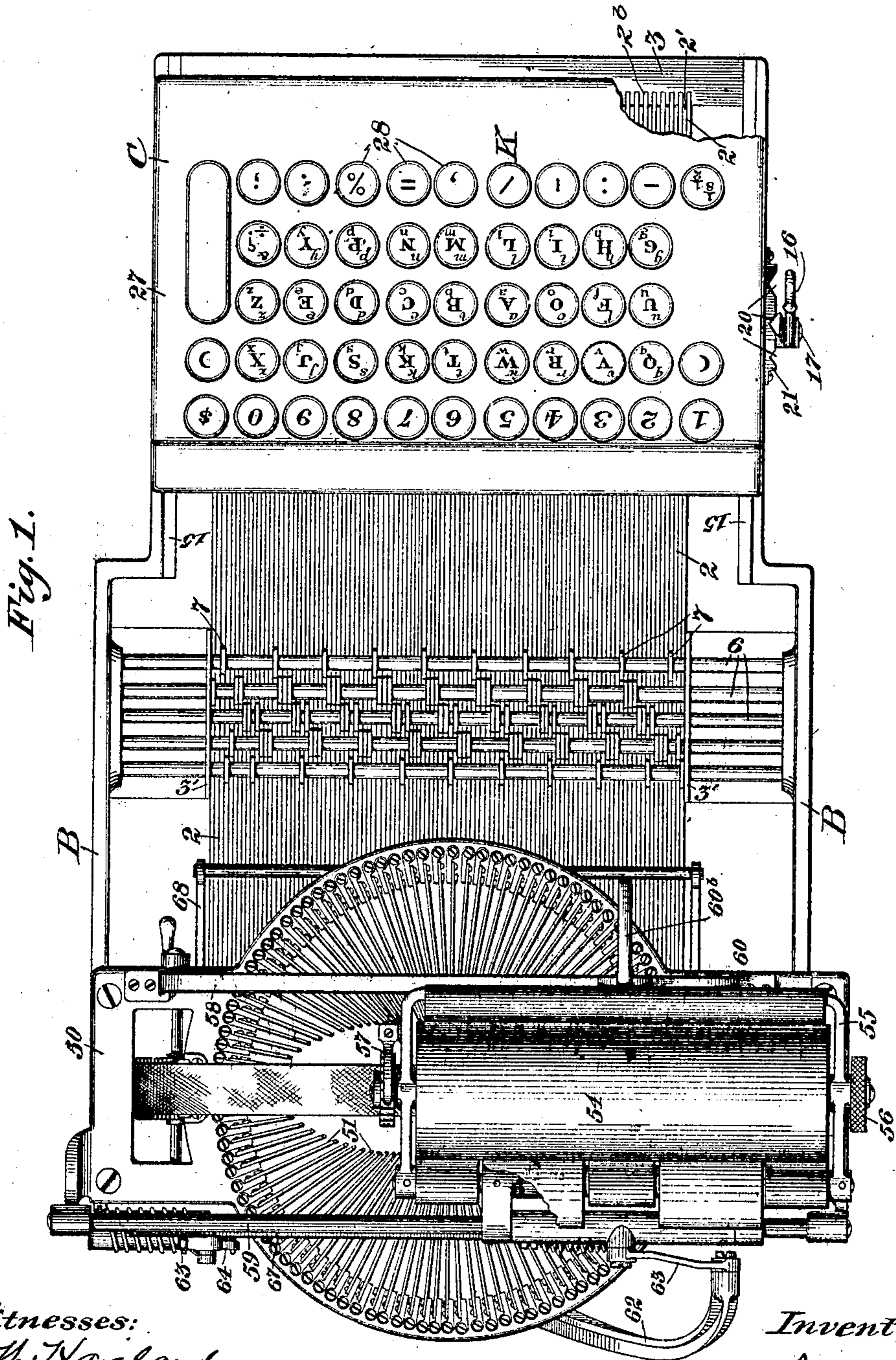


F. H. RICHARDS.
KEY MECHANISM FOR TYPOGRAPHIC MACHINES.
APPLICATION FILED JAN. 2, 1901.

913,306.

Patented Feb. 23, 1909.
6 SHEETS—SHEET 1.



Witnesses:
F. H. Norland
C. A. Jarvis.

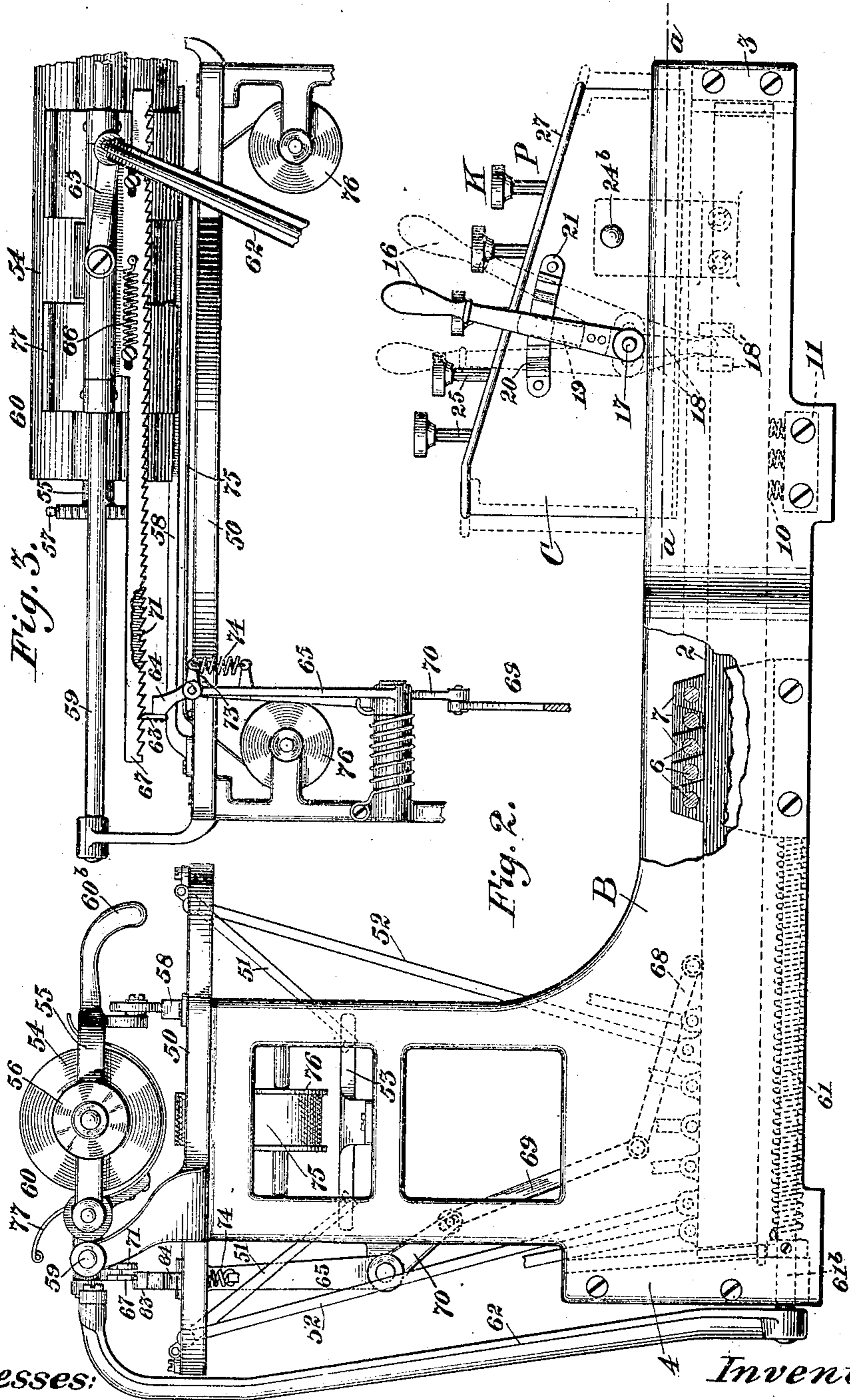
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6 SHEETS—SHEET 2.



Witnesses:
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6 SHEETS--SHEET 3.

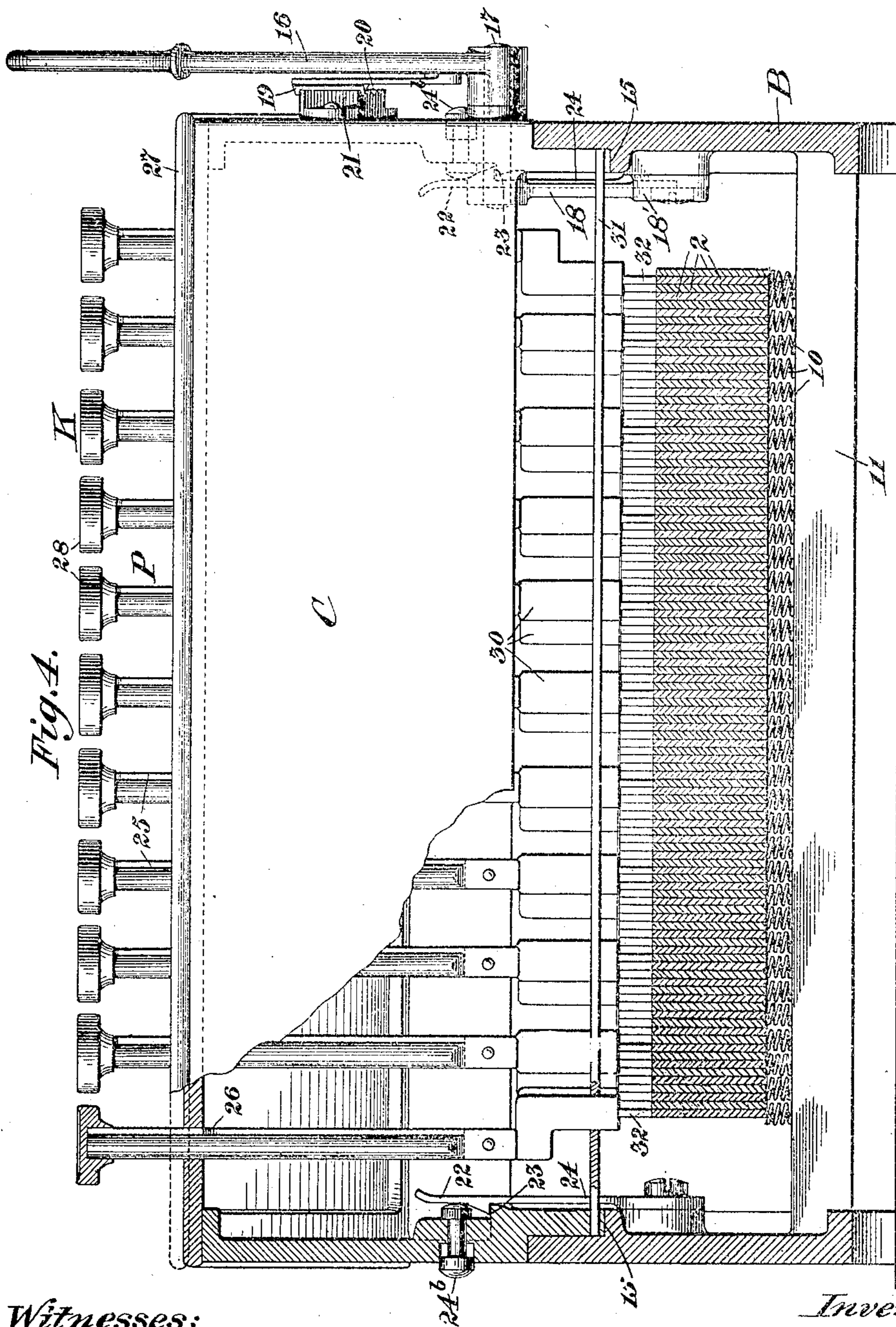


Fig. 4.

Witnesses:
F. H. Nordlund
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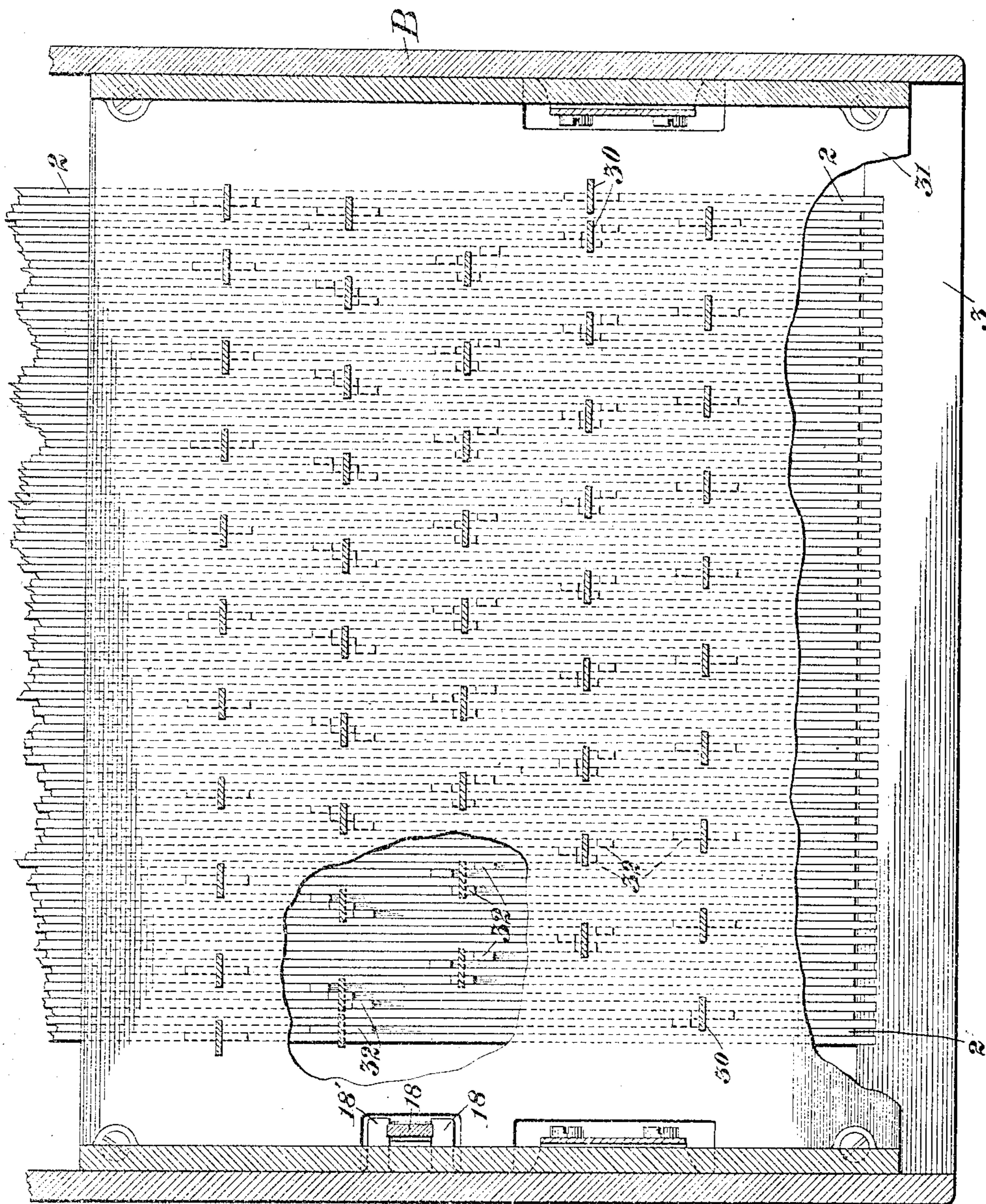
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6 SHEETS—SHEET 4.



Witnesses:
 J. H. Harland
 C. A. Jarvis.

Fig. 5.

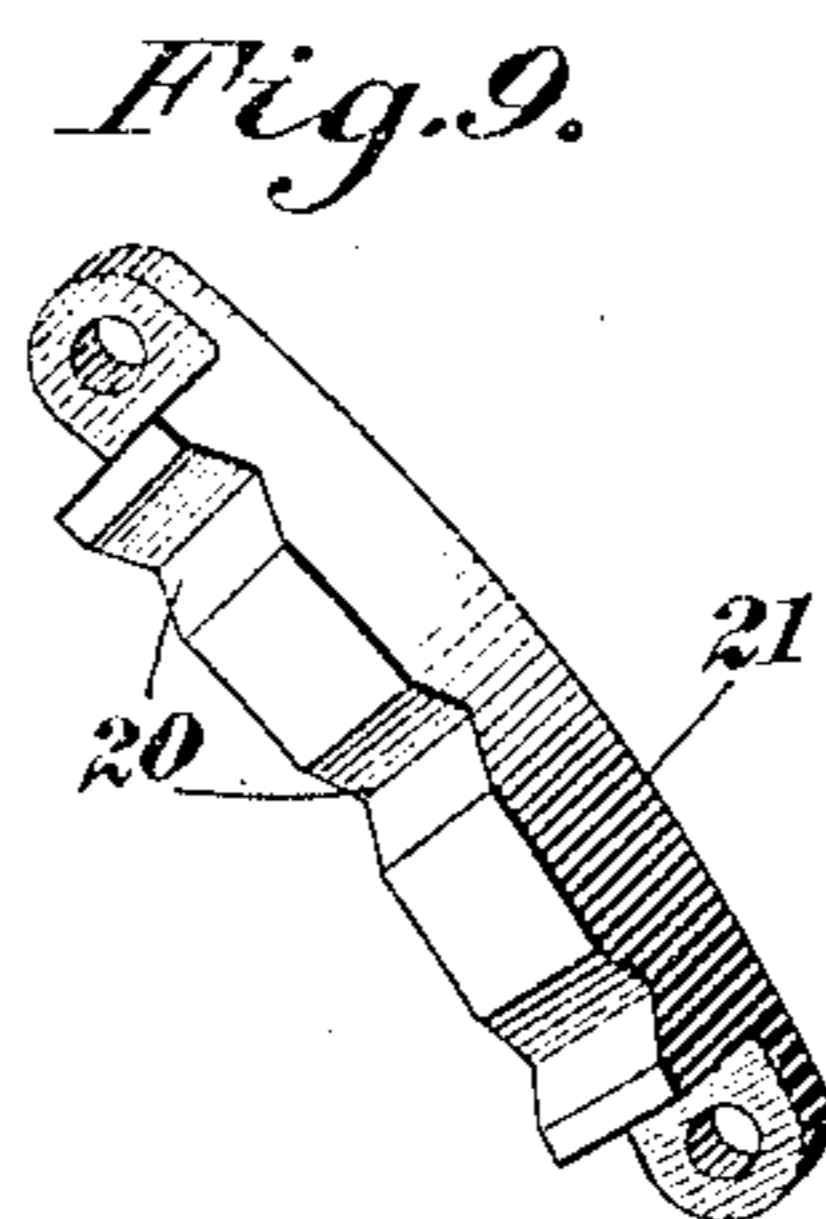
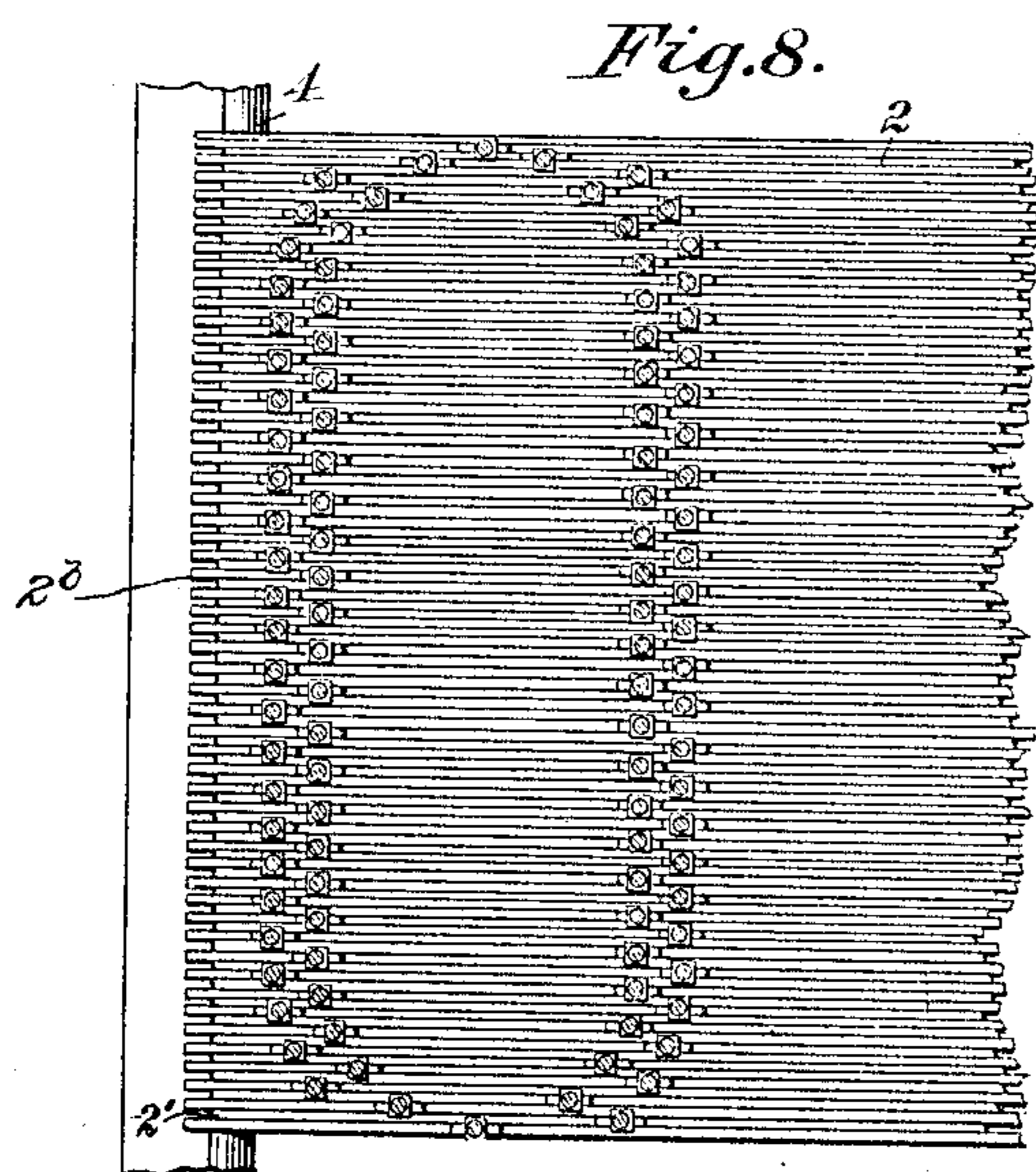
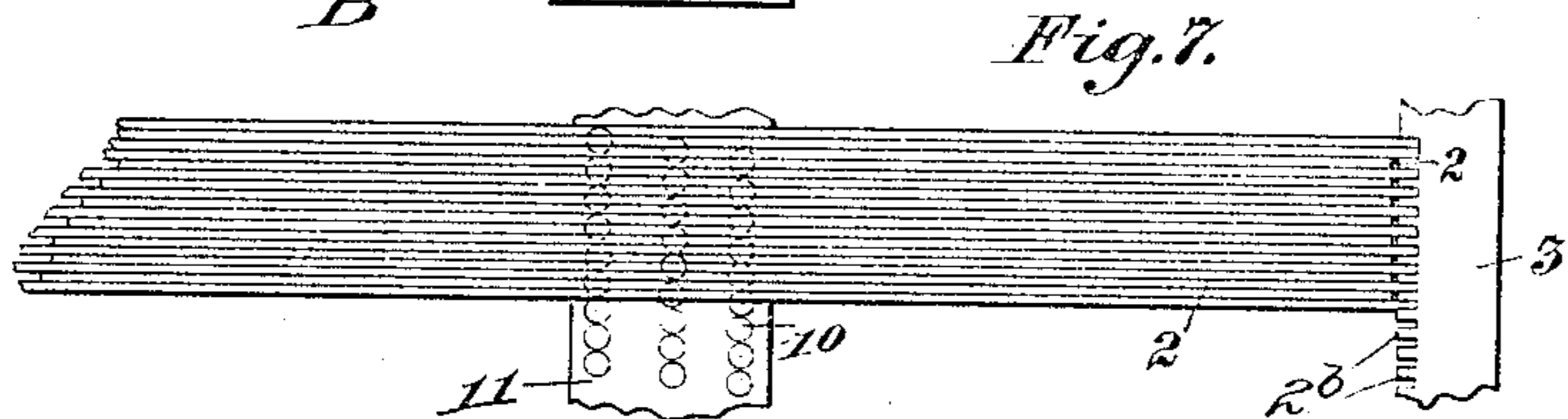
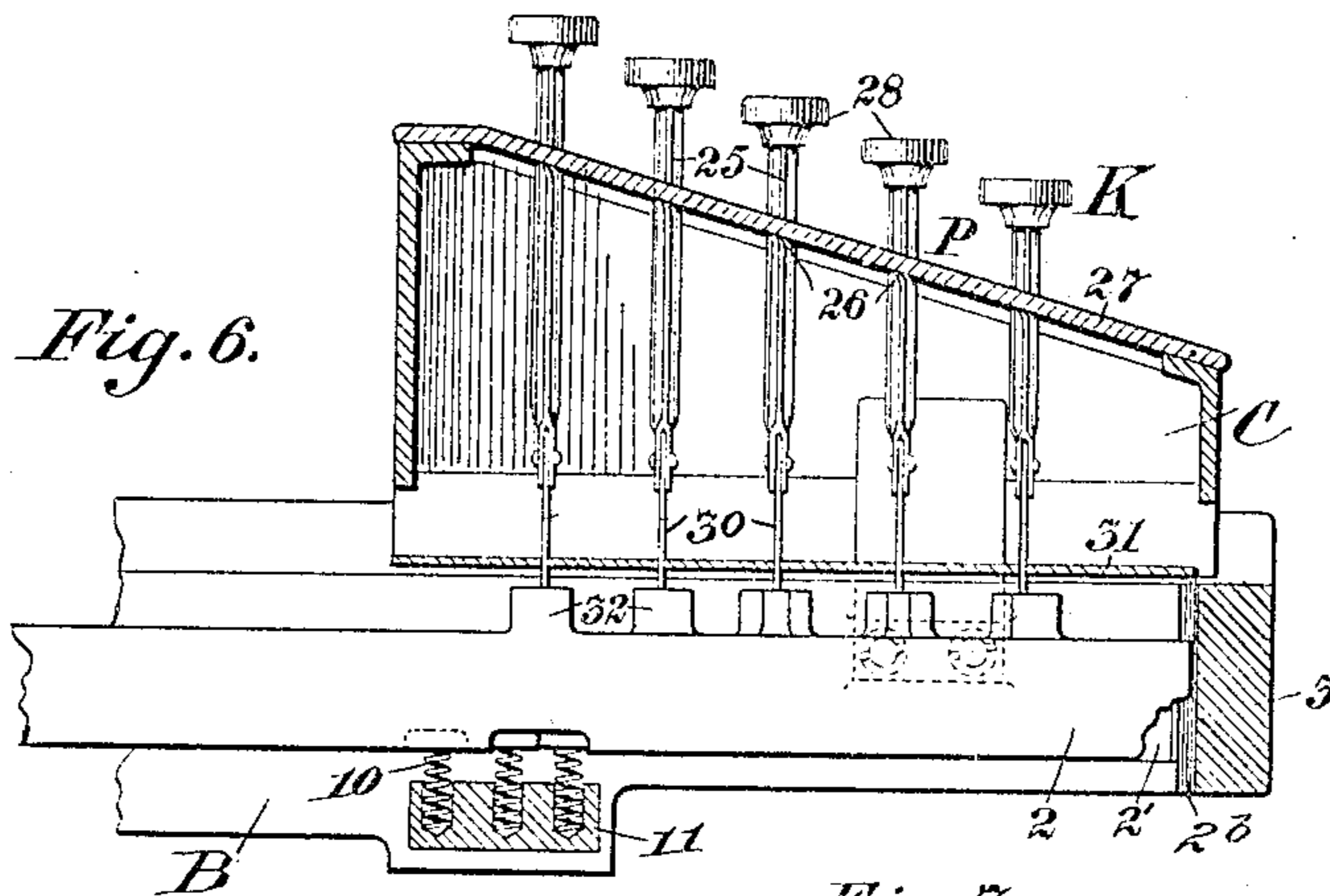
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913,306.

Patented Feb. 23, 1909.

6 SHEETS—SHEET 5.



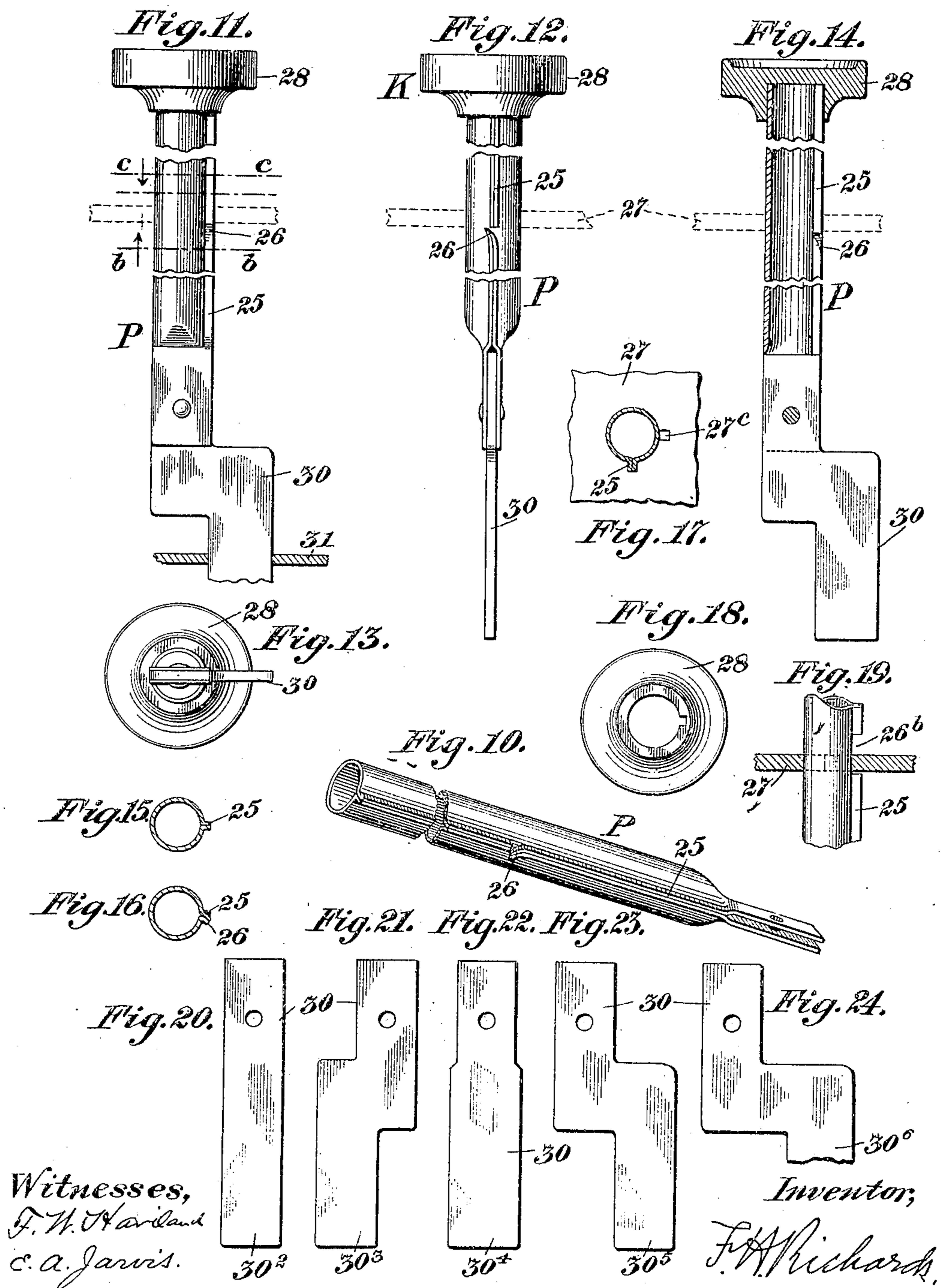
Witnesses:
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KEY MECHANISM FOR TYPOGRAPHIC MACHINES.
APPLICATION FILED JAN. 2, 1901.

913,306.

Patented Feb. 23, 1909.
6 SHEETS—SHEET 6.



Witnesses,
F. H. Harland
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F. H. Richards.

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. 913,306.

Specification of Letters Patent.

Patented Feb. 23, 1909.

Application filed January 2, 1901. Serial No. 41,831.

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 relates to key mechanism of a character which renders it particularly adapted for use in typographic machines, and has for an object to provide a mechanism whereby any individual one of a number of separate parts or devices designed to be actuated by a single device may be so operated to the exclusion of all others while the particular one operated is under control. For example, it is required to operate from a given lever or key in one instance a lower case character, and in another instance an upper case character.

An object of the present invention is to furnish mechanism whereby these results may be accomplished.

My present improvements are applicable to typographic machines in general, and they may be used in connection with typewriting-machines as illustrated, for instance, in the drawings accompanying the following specification, but it will be understood that in so illustrating and describing an embodiment of the invention in such particular class of machines, the applicability of the invention is in nowise limited thereby.

In the drawings referred to, Figure 1 is a plan view of a typewriting-machine embodying my invention, a part being broken away. Fig. 2 is a side elevation thereof, a part also being broken away in this figure to show the construction at the fulcrum portions of certain rock-levers. Fig. 3 is a longitudinal elevation of certain feed mechanism and illustrates the same as it appears when viewed from the rear of the machine.

Fig. 4 is a transverse vertical section of the machine on a somewhat enlarged scale, the plane of the section being located just to the rear of the key-board, and the direction in which the section is viewed, being from the rear toward the front of the key-board.

Fig. 5 is a horizontal section on an enlarged scale, the plane of the section being that indicated by the line *a-a*, in Fig. 2; certain portions are broken away in this figure, while certain other portions are removed.

Fig. 6 is a vertical section taken on a plane extending from front to rear of the machine and shows a portion adjacent to the key-board thereof. Fig. 7 is a plan view of the end portions of a part of a set or bank of rock-levers. Fig. 8 is a similar view of the opposite end portions of the set of levers. Fig. 9 is a perspective view on a somewhat enlarged scale of a locking or retaining segment used in the machine. Fig. 10 is a perspective view on a somewhat enlarged scale of a push-rod, a portion between the ends of the rod in this figure being removed. Fig. 11 is an elevation on a somewhat enlarged scale of the push-rod illustrated in Fig. 10, certain portions being removed, and shows the key and a portion of the foot-piece of the lever. Fig. 12 is a view of the rod, &c. at right angles to Fig. 11. Fig. 13 is a bottom view of the rod, &c. as set forth in Fig. 11. Fig. 14 is a lengthwise section through the rod. Figs. 15 and 16 are cross sections of the rod taken on the planes of the lines *b-b*, *c-c*, respectively, in Fig. 11, the sections being viewed in the direction of the arrows in that figure and certain portions being removed. Fig. 17 is a section similar to Fig. 15, but shows a portion of the guide-plate for the push-rod. Fig. 18 is a view of the lower surface of the key or finger-piece shown in Figs. 11 and 14, inclusive, the same being removed from its position on the upper extremity of the push-rod. Fig. 19 is partly a section and partly an elevation upon a scale similar to that to which Figs. 10 to 18 are drawn and shows a slightly modified construction of the push-rod. Figs. 20 to 24, inclusive, illustrate on a scale similar to that of the immediately preceding views, various forms of push-rod foot-pieces.

Similar characters of references designate corresponding parts in all figures.

In the typewriting-machine chosen for the purpose of illustrating an embodiment of the present invention, B designates the supporting and inclosing framework of the machine. This framework B is of some suitable form and of any desired construction and material appropriate to the purposes which it is to fulfil.

According to my present invention I find it convenient to group together the several parts or devices, any desired one of which is capable of being actuated at will to the

exclusion of all others, and to so dispose such group with respect to its actuating device as to render it possible for any individual member of such group, and the actuating device therefor to be brought into proper operative relation.

In carrying out my present invention also mechanism is provided whereby, under the will of the person manipulating the machine the relation of the actuating device to the different members of the group of actuable parts or devices may be altered and a different part or device be rendered operative therefrom. In some cases, however, it may be desirable for the organization to be such that not only is an actuating device or a number of them each capable of actuating any one of a number of parts or devices at will, but also that another device or a plurality of the same shall always cause the operation of identically the same part or device despite the fact that by an alteration of the relation a different part or device will be caused to operate by the actuation of one of the first-mentioned actuating devices. To illustrate; in shifting from the upper to the lower case, or vice versa, in that class of typewriting-machines in which each type is mounted upon a separate typebar, it is plain that while the letter types are changed, still the types for impressing punctuation marks and numbers may be similar for both upper and lower cases. In other words, assuming that but one typebar is involved in printing any single character in the same font in those instances in which types for printing the marks specified are the same for both upper and lower cases, then in going from one case to the other certain of the typebars will be changed and other bars operated, while other characters will be printed by the same typebars in both instances. To this end the mechanism aforesaid involves a construction whereby such transfer for the same or analogous purposes from one bar to another may be made in some cases, while no transfer is made in other cases.

The parts hereinbefore referred to as being severally operative from an actuating device or a plurality of the same are herein shown in the form of rock-levers, denoted generally by the number 2, and located side by side in the bottom portion of the casing B.

Preferably the method of mounting the levers 2 will be such as to provide mutual support and guidance for the individual levers; for instance, the end portions of alternate rock-levers may enter and the latter be guided by suitable slots 2^b formed in cross-bars 3 and 4, which may conveniently, as herein shown, consist of the front and rear cross-frames, respectively, of the main frame B. The distance between any two consecutive slots being made approximately

equal to the width of an intermediate lever 2', these latter may be located in the spaces between the alternate levers when placed in position in the slots and be guided in their motions by them.

In the drawings accompanying this specification, the actuating devices before adverted to are represented as push-rods, designated generally by the letter P, disposed in a number of rows extending from the front toward the rear of the machine, or, in other words, lengthwise of the levers 2. They carry, as shown at their upper extremities, keys or marked fingerpieces, designated generally by the letter K. Pressure applied to one of these keys K serves to operate a determinate rock-lever 2 selected in the manner and by means to be described later.

As herein illustrated, the several levers 2 are shown fulcrumed intermediate their ends by stationary rods 6 corresponding in number to the number of push-rods P in each of the aforementioned rows thereof and extending from side to side of the machine where their ends may be secured in any suitable manner to the framework B. To further strengthen these pivotal rods 6 laterally they may pass through apertures in supporting plates 3' on each side of and close to the bank of levers 2.

It is desirable in the operation of a machine constructed as illustrated that the movement of the several rock-levers 2 at their operative ends, that is, the rear end of each lever, should be substantially the same whether the lever be operated by a push-rod P at one end or the other of the corresponding row or by an intermediate push-rod. For the purpose of attaining this equality of movement, therefore, and assuming that the several push-rods are designed to all have substantially the same amount of depression, those levers which are operated by the push-rod nearest the front of the machine in the several rows may be strung upon that pivotal rod 6, which is nearest the front, while as the leverage tends to decrease as the push-rods are located further and further toward the rear, this decrease may be compensated for by stringing successive sets formed by the rods in each row upon pivotal rods 6 located successively further and further toward the rear of the machine. The pivotal portion of each lever 2 may be in an extension projecting from the edge thereof as shown. Each rock-lever 2 reacts against its respective push-rod P, and for the purpose of causing the positive return of the lever and its push-rod after actuation, the former may be constantly urged toward its push-rod by a suitable spring 10, which properly should react at all times against its own particular rock-lever and no other. The construction set forth in Figs. 6 and 7 particularly will

enable this result to be attained, in which figures the springs 10 are located in suitable depressions in a cross-piece 11 extending from side to side of the machine. Each spring bears against the edge of its lever, while the portions of the adjacent levers with which the size of the spring would cause it to contact are recessed to a depth sufficient to permit the play of those levers without affecting the spring. Coming now to a description of the said actuating devices which, as previously stated, consist, in the present embodiment, of the push-rods P, they are shown mounted adjacent to the front ends of the rock-levers 2 with which they coöperate. Provision is made whereby the levers and push-rods may be shifted into different relations with respect to each other in such manner as to render, in general, a push-rod capable of operating one of those levers when in one position and another lever in another position. For this purpose they are in the present drawings shown mounted in a carrier, designated generally by the letter C, box-like in form and movable to and fro lengthwise of the rock-levers 2 upon guides 15, by means of a hand-lever 16, secured to a pivot pin 17 which extends through and is journaled in the side of the carrier. This pin 17 has affixed to it an arm 18 whose lower extremity passes between shoulders 18', 18' upon the main frame B, which constitutes the fulcrum about which the hand-lever is swung to move the carrier. For the correct positioning of the carrier and its retention in an adjusted position, the lever 16 may be supplied with an elastically-supported tooth or detent 19 adapted to enter a notch 20, constituting one of a number formed in a locking segment 21, (see Fig. 9.)

The carrier C may, with advantage, be removable from its position on the framework B. To permit of this, and for the further purpose of confining the carrier to a to and fro movement when in place upon its guides 15, it may be gibbed to its guides by means of a retaining hook 22 at each side, which fits over a ledge or shoulder 23 upon the carrier. Each hook 22 is supported upon an elastic or spring-like finger 24, which normally holds the hook in the position shown in Fig. 4, but is capable of being bent inward to disengage the hook from the shoulder by means of a bolt or releasing pin 24^b, accessible from the exterior of the machine. A pressure upon the pin 24^b at each side will permit, it is evident, the carrier to be lifted from the machine.

Certainty of uniform action is assured at all times between a push-rod P and the rock-lever 2 with which it coöperates by keeping their contacting surfaces firmly pressed together. This may be done by permitting

each push-rod P to be forced upward against a shoulder by means of its corresponding rock-lever spring 10.

The push-rods P may be of any desired and appropriate construction and dimensions; for instance, they may vary in height from front to rear of the machine to give the stepped arrangement shown in order to facilitate their operation, and they may have their bodies each formed of a single strip pressed into circular shape as shown in the present drawings with an exterior longitudinal flange 25. If such be their construction, the aforementioned shoulder referred to as limiting the upward movement of a push-rod may be formed by bending said flange 25 abruptly to one side, (see 26 particularly in Fig. 10,) or such shoulder may be formed by removing a portion of the flange altogether, (see 26^b particularly in Fig. 19.)

The upper plate 27 of the carrier C may be perforated with a suitable number of openings in which the several push-rods P are guided, and each of the push-rod openings in the plate may have a lateral slot 27^c for the passage of the flange 25 on the push-rod. A side of this slot forms a stop for shoulder 26, if the construction be such as exhibited in Fig. 10. If, however, the push-rod construction be such as set forth in Fig. 19, the push-rod may be passed through the aperture until the removed portion of the flange comes opposite the slot 27^c in the plate, when upon turning the push-rod slightly the flange 25 will be brought out of alinement with the slot, and the shoulder 26^b will coact with the edge of the aperture opening. A key 28 may be secured to the upper end of its proper push-rod in any desired manner.

As set forth in the drawings herein, the lower end of a push-rod P is bifurcated for the insertion and attachment therein of the push-rod foot-piece, designated generally by 30, a number of different shapes of which are shown at 30², 30³, 30⁴, 30⁵, and 30⁶, Figs. 20 to 24 inclusive. The purpose of this variation will presently appear. Each foot-piece 30 may pass through a bottom plate 31, by which means the lower end of the push-rod may be guided.

From the foregoing explanation it is plain that one or more push-rods P are designed to operate singly any one of a number of rock-levers 2 to the exclusion of the others, the particular one which is operative from any push-rod being under the control of the person manipulating the machine. In the particular organization illustrated, the shifting of the carrier C serves to effect this change of operative relation between a push-rod and the rock-levers 2 designed to be operated by it, by reason of the shifting of the contact of the push-rod foot-piece 30 from one lever to another. It is evident

from the foregoing that, as shown, a push-rod is moved bodily to effect the operation of a new rock-lever. This result may be brought about, however, if the bottom guide
 5 plate 31 alone is moved, which may therefore be regarded as a carrier for shifting the contact.

On referring to Fig. 5, which represents the relation between the foot-pieces 30 of
 10 the push-rods and the levers upon which such pieces bear, it will be seen that the line of cross-sectional length of the pieces extends transversely to the lines of length of the rock-
 15 levers 2; that is to say, the push-rod foot-pieces extend across the rock-levers. The dimension of a foot-piece 30 is such as to reach from the lever on one side to the furthestmost
 20 one on the other side of the entire number or group of levers with which its contact is possible. In the present illustration, the greatest number of rock-levers which it is possible for any one push-rod singly to
 25 operate is three, but manifestly this number might be different. In this connection, also, it will be noticed that there are three notches in the locking segment 21 corresponding to the three positions of the carrier C. In this
 30 instance, also, each push-rod foot-piece 30 is in contact with a raised portion 32 of the rock-lever which extends from the edge thereof toward the foot, and is of a height preferably at least equal to the distance each
 35 foot-piece moves when it is depressed. This construction results in the operation, during the actuation of a push-rod of that rock-lever only with whose raised portion the foot-piece happens to be in contact. These
 40 several raised portions 32 on a group of rock-levers 2 with which any particular push-rod P is adapted to co-act are displaced with respect to each other from front
 45 to rear of the machine in such manner that, upon shifting the carrier C to move a push-rod backward or forward, this latter will be shifted from one rock-lever to another in
 50 that group, and consequently an actuation of the push-rod after such shifting will serve to operate a different lever to that which such actuation would have accomplished before the shifting of the carrier.

To bring the bearing surface of any particular push-rod foot-piece 30 into the proper position to coact with any one of the rock-
 55 levers in its group where such group is not in line with the axis of its rod, it may be necessary to provide a form of foot-piece in which the bearing portion is offset to one side.

Referring to Figs. 20 to 24, inclusive, different forms of push-rod foot-pieces are
 60 illustrated, foot-pieces 30² and 30⁴ being adapted to bear upon a lever when the group thereof is in line with the actuating push-rod. The only substantial difference
 65 between the two is a difference in width

whereby one is adapted to coact with a group composed of a greater number of levers, while in the remaining forms illustrated, different amounts of offsets are given to the bearing portion of the pieces. 70

In general, it is desirable that a shifting from one series of actuatable devices or levers to another for the purpose of operating different types or for any other purpose should not involve a change in all the
 75 devices or levers, since some of these actuatable levers may be the same whichever series is to be rendered operative or font of types or impression devices are used, as, for instance, types for punctuating purposes, 80
 and particularly the rock-lever operated by the push-rod of a spacing-key. In such a case the action of any push-rod P may be confined to any particular rock-lever 2 by
 85 lengthening the raised portion 32 of the rock-lever to an amount sufficient to maintain contact with the foot-piece 30 of the push-rod during the entire shifting movement of the carrier C.

The present invention being illustrated in
 90 an application thereof to a typewriting-machine, the aforementioned actuatable parts, consisting as here described of the rock-levers 2, may be utilized to effect the
 95 operation of an impression and feed mechanism. These mechanisms may be of any of the suitable forms well known in the art, or of any other appropriate construction, or that herein illustrated, which will now be
 100 described.

Pivotaly supported on a platform 50
 105 formed by extensions of the main frame B is a series of typebars, designated generally by the number 51, and connected each bar to its corresponding rock-lever 2 by a link 52. Normally, or when idle, these typebars may
 110 rest in a supporting-basket 53, from which a bar is raised when its corresponding key is depressed to operate on or impress a character upon the surface of the paper or other material on the platen 54. This platen 54 is,
 115 in the present instance, journaled in a frame 55, wherein it may be rotated by means of pressure applied to a thumb-wheel 56, while it is held in an adjusted position by a retaining detent 57. The frame 55 is shown
 120 as being mounted to travel along a rail 58 at one side thereof, while at the other side it is swiveled to a bar 59 forming one of the guides for the platen 54, and associated parts which together constitute the carriage,
 125 designated generally by 60. A handle 60¹ may be provided for moving the carriage 60 back to its starting position on the guides and for swinging the same on the bar 59 to expose the impression or printed surface on the platen.

The mechanism for imparting a step-by-step traversing movement or feed to the carriage 60 may embody an escapement operat- 130

ing substantially in the following manner. A helical spring 61 coiled around a rod 61^b journaled in the main frame B, when under tension, urges the carriage 60 in one direction through the medium of an arm 62 joined at its upper end to the carriage by a link 63. The movement which would result from such tendency is, however, controlled by a vibratory ratchet-tooth 63 affixed to an arm 64, supported by an oscillatory lever 65, which in turn is pivotally connected to the main frame B or an appurtenance thereof. Normally the ratchet-tooth 63 is held in a position extending across the line of movement of the tooth of a rack-bar 67 by the lever 65, when the latter is in a position at one extremity of its movement and toward which it is urged by a spring 66. The rack-bar 67 is supported on the carriage 60, and mounted to slide thereon to and fro in the line of the carriage travel, but constantly urged in the same direction relatively to the carriage that the carriage is urged by the spring 61. The tension of spring 61, is, however, greater than the tension of spring 66; hence, in the normal or idle condition of the carriage 60 it is held stationary by means of this rack-bar 67, and engaging ratchet-tooth 63, the former being forced by the latter toward and occupying its extreme position relatively to the carriage toward the left-hand thereof as seen in Fig. 3. When, however, a rock-lever 2 is elevated by reason of the depression of its coacting push-rod P, a frame 68 is tilted upward and through an attached lever 69 and an arm 70 to which it is jointed and which is fixed relatively to the oscillatory lever 65, this latter is swung upon its pivot sufficiently to carry the ratchet-tooth 63 into the space between contiguous teeth of a second rack-bar 71, fixedly secured to the carriage 60 or an appurtenance thereof. No movement of the carriage results from this movement of the tooth 63 from one rack-bar to the other, but the rack-bar 67 having been released springs forward in the direction of the carriage travel by reason of the tension of spring 66. Now, when the actuated rock-lever 2 moves back into its idle or normal position, the frame 68 follows it, such movement being assured, for instance, by a spring 72. The oscillatory lever 65 being now free to move is swung back to its original position by spring 66 carrying the ratchet-tooth 63 out of engagement with the rack-bar 71, and into engagement with the rack-bar 67. Upon the release of the rack-bar 71 the tension of the spring 61 overcomes the tension of spring 66, and moves the carriage 60 on its guides until the carriage is stopped from further movement by the completion of the possible movement of the rack-bar 67, whereupon the carriage comes to rest and a step in the feed movement has been effected.

A free backward movement of the carriage 60 under the pressure of the hand is rendered possible by pivoting the arm 64, supplied with the ratchet-tooth 63 to the oscillatory lever 65, in such manner that the ratchet-tooth may be moved downward out of the way of the rack-bar teeth as the carriage is slid backward. The proper operative or upright position of the ratchet-tooth 63 is determined by a stop 73, toward which the arm 64 is constantly urged by a spring 74. An inking ribbon 75 is shown which is disposed intermediate its take-up rollers 76, 76, in proper relation to the printing point on the platen. A guard 77 for the paper passing around the platen may also be supplied. These feeding and inking mechanisms are substantially those embodied in the well-known Caligraph type-writing machine.

A machine constructed in the manner illustrated and particularly described operates substantially in the following manner. Assuming the carrier C to be in any certain position, a depression of a push-rod P by the exertion of pressure upon its key serves to actuate that particular rock-lever 2 upon whose raised portion 32 the foot-piece 30 of the push-rod bears. An actuation of the corresponding typebar 51 results and an inked impression is made upon the surface of the material on the platen 54, by reason of the interposed inking ribbon 75. Simultaneously with the movement of the inner end of the rock-lever 2 the frame 68 has been actuated, serving to shift the ratchet-tooth 63 from the rack-bar 67 to the rack-bar 71; through the described system of intervening levers and arms. When this frame 68 drops back into place the ratchet 63 is shifted back to the rack-bar 67, and a feed movement of the carriage 60 takes place by reason of the predominating tension of the spring 61, as and in the manner already described. Supposing, now, that the carrier C has been shifted by the manipulation of the hand-lever 16 at the side, some of the push-rods P will have been brought into operative relation with different rock-levers 2, while the foot-pieces 30 of certain other push-rods will have been merely slid along on the same raised portions 32, so that as a result some of the push-rods in this new position are adapted to actuate different rock-levers, while other push-rods are adapted to operate the same rock-levers as before.

The operation resulting from an actuation of a shifted push-rod is similar to its operation before the shifting of the carrier, and which has already been described.

Having described my invention, I claim—

1. The combination with a plurality of levers disposed side by side each of said levers having an engaging face, said faces occupying positions differing one from the other longitudinally of said levers, of an

actuator extending transversely of all the levers, and means for shifting the actuator lengthwise of the levers to thereby shift it out of coöperative relation with a lever or
5 levers and into such relation with another lever or levers.

2. The combination with a plurality of levers provided with projections extending from one edge of the respective levers and
10 occupying positions differing one from the other longitudinally of said levers, of an actuator extending transversely of all the levers, and means for shifting the actuator lengthwise of the levers to thereby shift it
15 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
20 levers disposed side by side, of an actuator extending transversely of all the levers, and a carrier on which the actuator is mounted and which is shiftable lengthwise of the levers and is adapted upon such lengthwise
25 shifting to shift the actuator out of coöperative relation with a lever or levers and into such relation with another lever or levers.

4. The combination with a plurality of
30 levers disposed side by side, of a push rod for actuating the levers, a foot piece secured to the push rod 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
35 depression, and a keyboard detachably engaged with the key frame and in which said push rod is mounted and shiftable longitudinally of said levers, each of said levers
40 having an engaging face with which the foot piece of the push rod is adapted to engage in some position of the key board.

5. The combination with a plurality of levers, actuators associated therewith and
45 each adapted to actuate at will a predetermined lever with which it is associated, each actuator extending transversely of all the levers with which it is associated, and a shiftable member in which said actuators
50 are mounted and which has a guided movement in the direction of the length of the levers, each of said levers having a face with which its associated actuator is adapted to engage at some position of the shiftable
55 member.

6. The combination of a plurality of levers each provided with an actuator engaging face, said faces being arranged in groups occupying positions differing one
60 from the other longitudinally of said levers, an actuator associated with each group and each adapted to engage at will a predetermined face with which it is associated, each actuator extending transversely of all
65 the levers of the group with which it is asso-

ciated and a shiftable member in which said actuators are mounted and which has a guided movement in the direction of the length of the levers for shifting said actuators relative to said engaging faces. 70

7. The combination with a plurality of levers disposed side by side, of a keyboard detachably engaged with the machine frame and shiftable longitudinally of said levers, and an actuator mounted on the keyboard
75 and removable with it from the machine frame, said actuator extending transversely of the levers, each of said levers being provided with an actuator engaging face and said faces being disposed each in a position
80 longitudinally of said levers differing from the positions of the faces on the other levers, said faces being disposed in the path of movement of said actuator.

8. The combination with a plurality of
85 levers disposed side by side, of a push rod for actuating the levers, a separate foot piece secured to the push rod, and a keyboard shiftable longitudinally of the levers and detachably engaged with the machine
90 frame and in which said push rod is mounted, said push rod extending transversely of the levers, each of said levers being provided with an engaging face and said faces being disposed each in a position
95 longitudinally of said levers differing from the positions of the faces on the other levers, said faces being disposed in the path of movement of said foot piece.

9. The combination of a plurality of
100 groups of levers, the members of each group being disposed side by side and each being provided with an actuator engaging extension and said extensions being disposed each in a position longitudinally of said levers differing from the positions of the extensions
105 on the other levers of said group and overlapping one with another in a direction transversely of the levers, of a keyboard detachably engaged with the machine frame
110 and shiftable longitudinally of said levers, and an actuator mounted on and shiftable with the keyboard and removable with it from the machine frame, said actuator extending transversely of the levers, an actuator
115 associated with each group and each adapted to engage at will a predetermined extension of the group with which it is associated, each actuator extending transversely of all the levers with which it is associated,
120 and a shiftable member in which said actuators are mounted and which has a guided movement in the direction of the length of the levers, said extensions being disposed in the path of movement of said actuator longi-
125 tudinally of said levers.

10. The combination of a plurality of groups of levers, the members of each group being disposed side by side and each being provided with an actuator engaging exten- 130

sion and said extensions being disposed each in a position longitudinally of said levers differing from the positions of the extensions on the other levers of said group and overlapping one with another in a direction transversely of the levers, of a keyboard detachably engaged with the machine frame and shiftable longitudinally of said levers, and an actuator mounted on and shiftable with the keyboard and removable with it from the machine frame, said actuator extending transversely of the levers, an actuator associated with each group and each adapted to engage at will a predetermined extension of the group with which it is associated, each actuator extending transversely of all the levers with which it is associated, and a shiftable keyboard detachably engaged with the machine frame in which said actuators are mounted and which has a guided movement in the direction of the length of the levers, said extensions being disposed in the path of movement of said actuator longitudinally of said levers.

11. The combination with a plurality of groups of key levers disposed side by side, of a shiftable keyboard 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 of the levers in the group with which it is associated, said levers each having a projection with which the foot piece of the associated push rod is adapted to contact in some position of the keyboard.

12. The combination of a guide member comprising a bar and a plurality of interspaced parallel guides, a plurality of alternate levers severally engaging said guides, and a plurality of intermediate levers, each severally engaged between and in close contiguity to each of a pair of alternate levers.

13. The combination with a set of levers, of a number of push-rods for actuating the same, a carrier on which the push-rods are mounted, a hand-lever for shifting the carrier, a hook at each side thereof for confining the carrier to its guides, and a pin or bolt for releasing the hook to permit the carrier to be removed from its position.

14. The combination with a set of levers, of a number of push-rods for actuating the same, a carrier on which the push-rods are mounted, a hand-lever for shifting the carrier, a hook at each side thereof for confining the carrier to its guides, a pin or bolt for releasing the hook to permit the carrier to be removed from its position, and a detent for locking the carrier in its shifted position.

15. The combination with a set of levers, of a push-rod adapted to actuate any one of the levers, a foot-piece for the push-rod extending from side to side of the set of levers, a carrier on which the push-rod is

mounted and which is adapted to shift the said foot-piece lengthwise of said levers; a guide-plate for the push-rod constituting a carrier, a hook at each side of the carrier for confining the latter to its movement on its guides, a pin or bolt for releasing the hook to permit the removal of the carrier, a hand-lever for shifting the carrier, and a detent for locking the carrier in its shifted position.

16. The combination of a plurality of groups of keys, of a plurality of levers therefor disposed side by side and each having a depression in its upper edge, an actuator associated with each group and adapted to actuate a predetermined lever of the group with which it is associated and extending transversely of said group, and a reaction device for each lever bearing against the same and having a portion projecting beyond the plane of the side of the lever located in the depression in the contiguous levers.

17. The combination of a plurality of levers, actuators associated therewith each for actuating a predetermined lever of a group of said levers upon being shifted into proper position, such actuator extending transversely of the levers with which it is associated, means for shifting said actuators longitudinally of the levers, said levers having depressions in their under edges and a reaction spring for each lever bearing against that lever and having a portion projecting beyond the plane of the side of the lever located in a depression in a contiguous lever, and a cross bar having cavities for holding said springs.

18. The combination of a plurality of levers each lever being provided with an actuator engaging projection, actuators associated therewith and each adapted to actuate at will a predetermined lever, each actuator extending transversely of a number of levers and having a length measured in such transverse direction which will enable it without transverse movement to operate any of the said levers, it having its actuator engaging projection in the path of movement at each working stroke, and a shiftable member in which said actuators are mounted and which has a guided movement in a direction transverse to the movement of the levers.

19. The combination of a plurality of levers each lever being provided with an actuator engaging projection, actuators associated therewith and each adapted to actuate at will a predetermined lever, each actuator extending transversely of a number of levers and having a length measured in such transverse direction which will enable it without transverse movement to operate any of the said levers having its actuator engaging projection in the path of movement at each working stroke, and a

shiftable member in which said actuators are mounted and which has a guided movement in a direction transverse to the movement of the levers, each of said levers having a face with which its associated actuator is adapted to engage at some position of the shiftable member.

20. The combination of a plurality of groups of key levers each lever having an actuator engaging face, the several engaging faces of each group occupying positions different one from the other longitudinally of said lever, an actuator associated with each group and adapted to actuate, according to its longitudinal position, a predetermined lever of the group with which it is associated, each actuator extending transversely of all the levers with which it is associated, and a shiftable member in which said actuators are mounted and which has a guided movement in a direction transverse to the movement of the levers.

21. The combination with a frame of a machine, of a detachable keyboard frame engaged with said machine frame, a shiftable keyboard carried by said frame, levers, and lever operating keys mounted on the keyboard and removable from the machine frame and the levers with the latter.

22. The combination with a plurality of levers disposed side by side, of a machine frame within which the same are mounted, a detachable keyboard frame engaging with said machine frame, keys for actuating said levers and carried by said keyboard frame and removable from the machine frame with the latter, of a push rod for actuating the levers, a foot piece secured to each of the push rods and extending transversely of the levers adapted to be actuated thereby.

23. The combination with a series of impression devices, of a series of levers equal in number and each permanently connected with an impression device, said levers having longitudinally disposed engaging faces

of varying lengths, a series of keys less in number than the number of levers and for engaging said faces upon the levers, and means for shifting the keys longitudinally of the levers whereby some of said keys will change their working relation with the levers and some of these will remain constant for varying the complement of active levers and permitting some of the same to be universal to each complement.

24. The combination with a plurality of levers disposed side by side, of a keyboard detachably engaged with the machine frame and shiftable longitudinally of said levers, and an actuator mounted on and shiftable with the keyboard and removable with it from the machine frame, said actuator extending transversely of the levers, each of said levers being provided with an actuator engaging extension and said extensions being disposed each in a position longitudinally of said levers differing from the positions of the extensions on the other levers and overlapping one with another in a direction transversely of the levers, said extensions being disposed in the path of movement of said actuator longitudinally of said levers.

25. The combination with a series of impression devices, a lever for each impression device; a series of keys less in number than the levers, and means for shifting the keys, the relation between the keys and levers being such that each of a number of the keys will in each of the shifted positions have engagement with the same lever and each of the remainder of the keys will in each of such positions have engagement with a different lever for changing a portion only of the active complement of the levers.

FRANCIS H. RICHARDS.

Witnesses:

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