

No. 670,151.

Patented Mar. 19, 1901.

W. C. ELLIS, Dec'd..

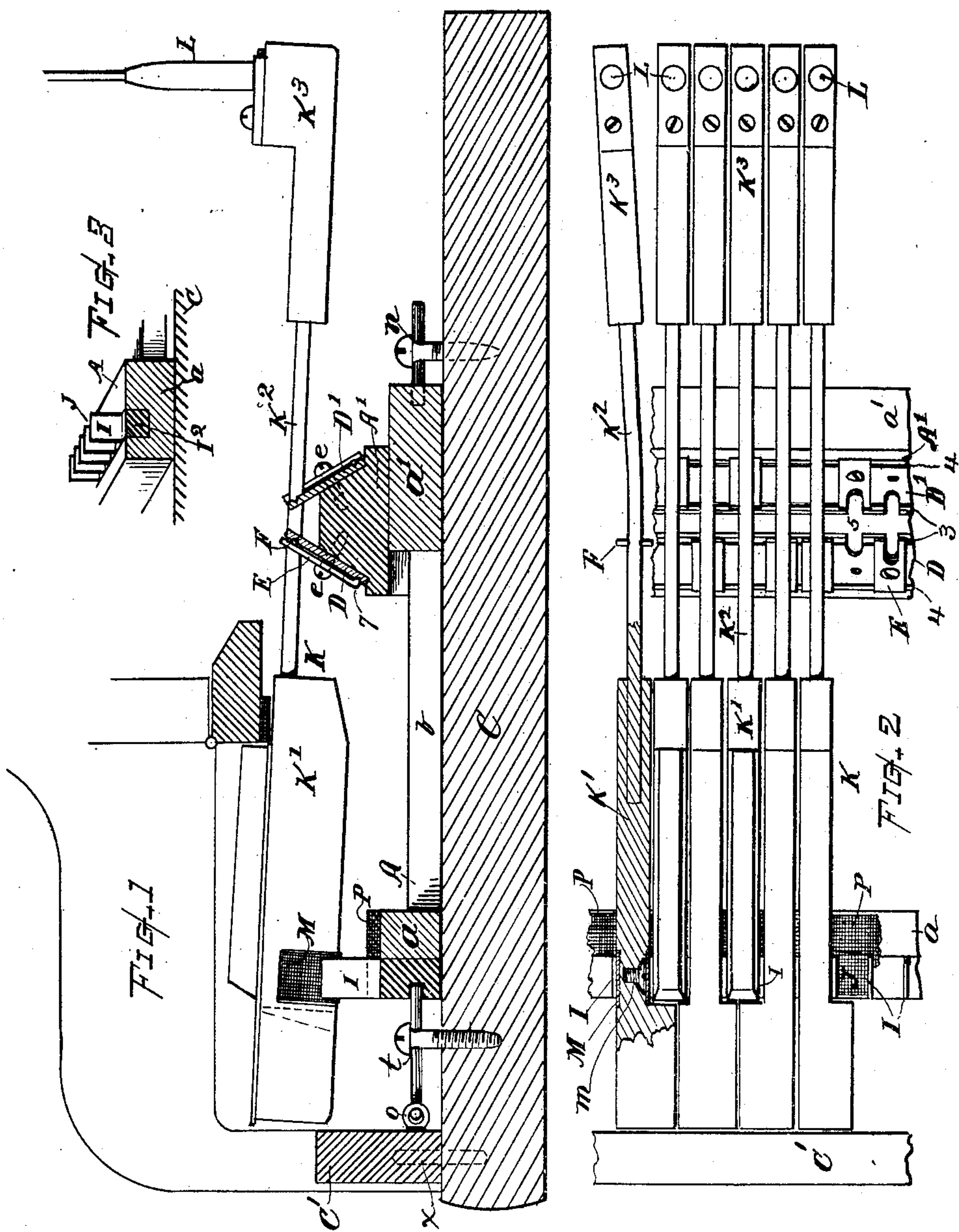
M. H. ELLIS, Executrix.

PIANO KEY MECHANISM.

(Application filed Aug. 3, 1900.)

(No Model.)

2 Sheets—Sheet 1.



WITNESSES.

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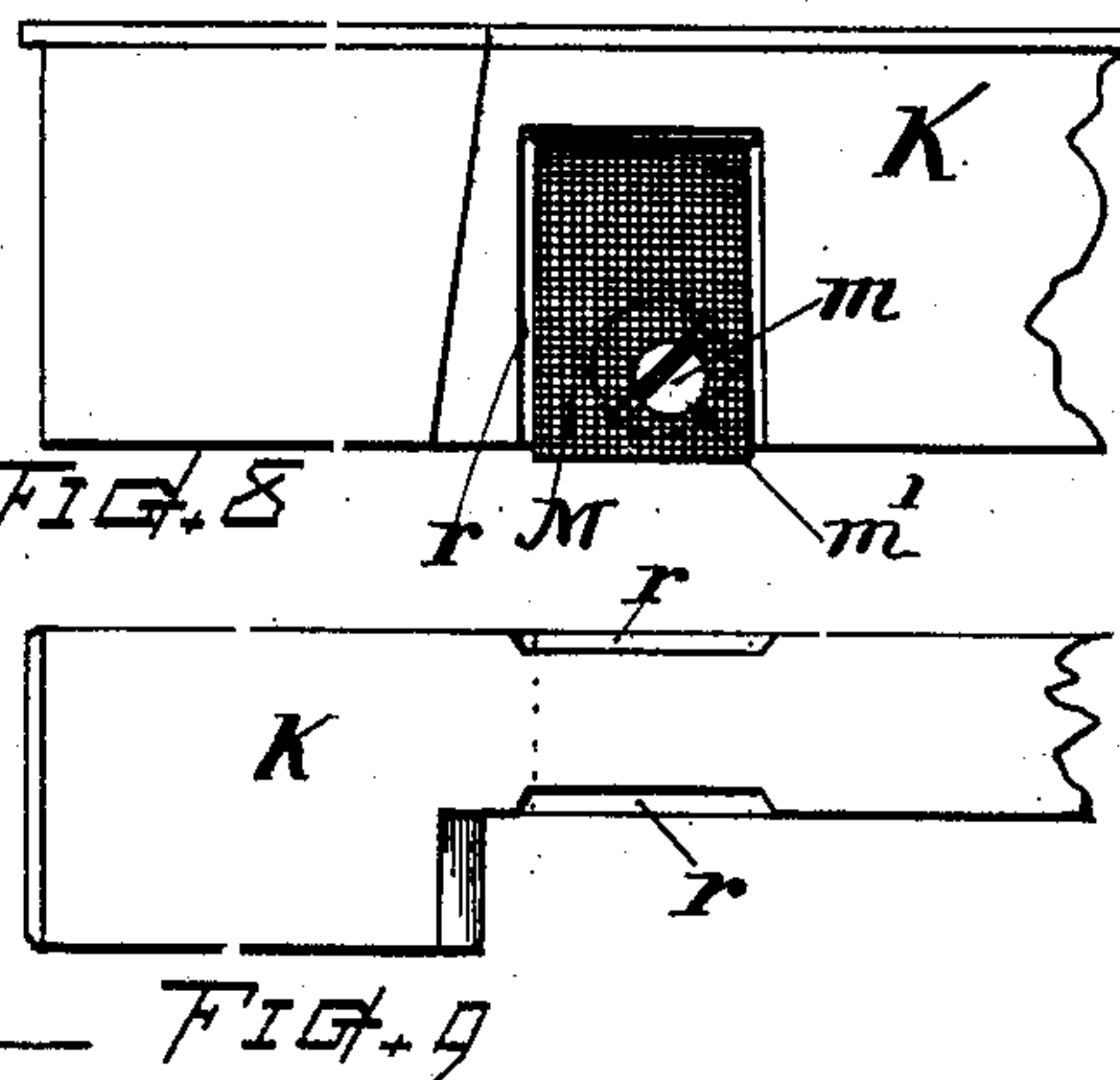
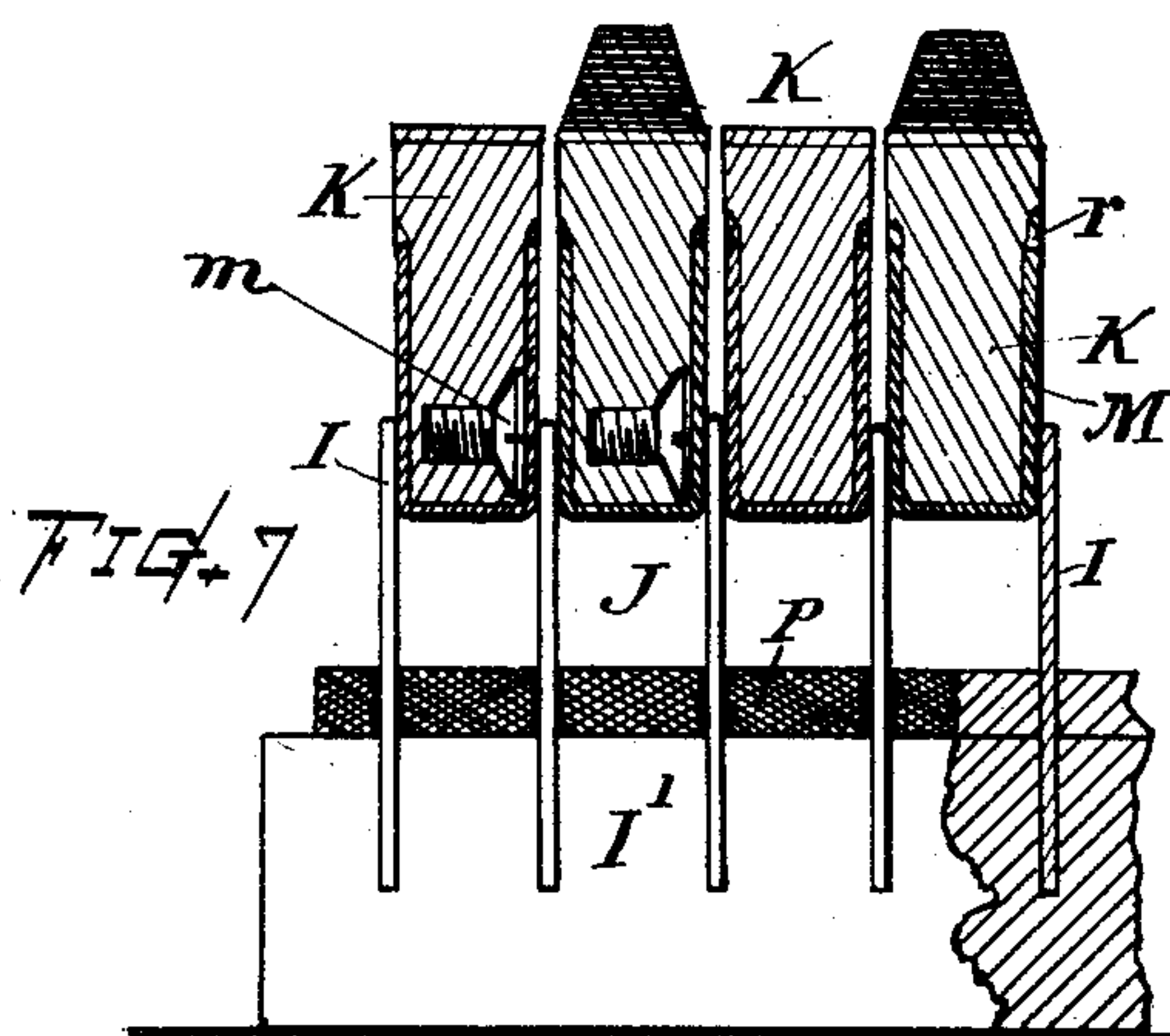
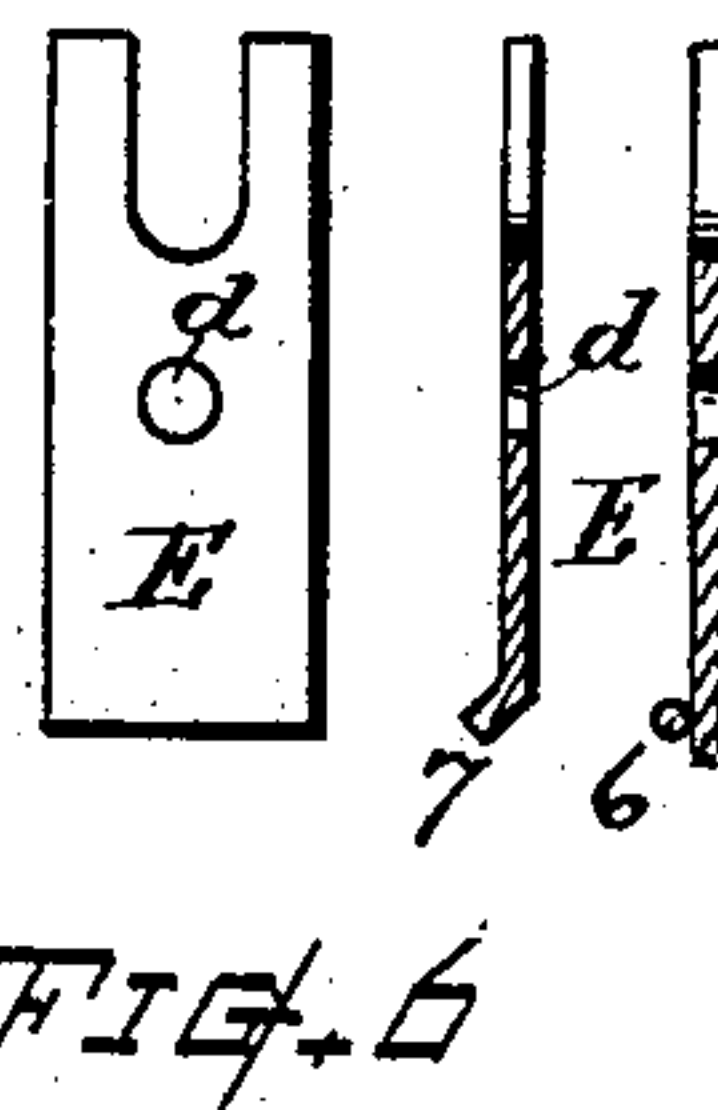
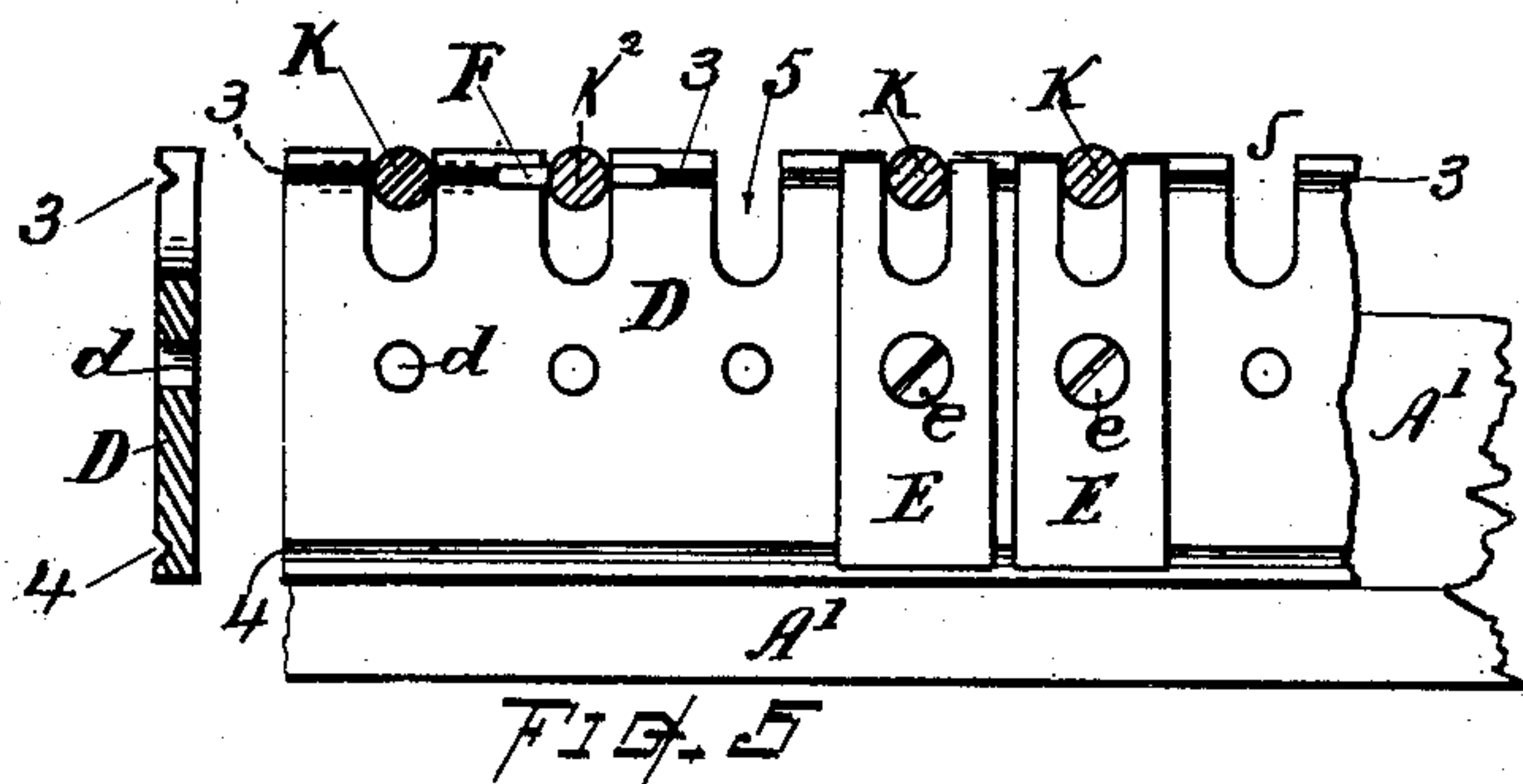
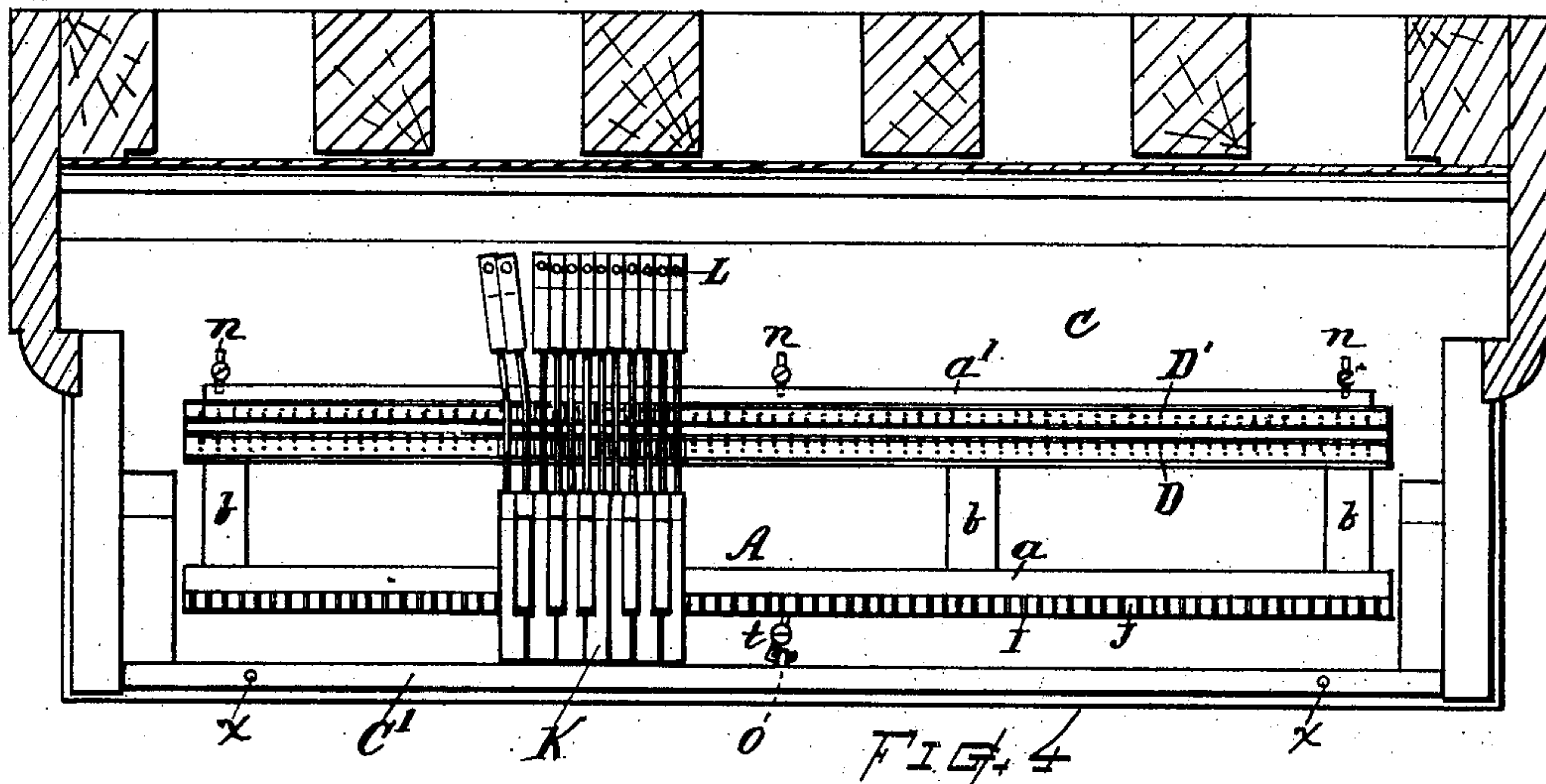
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PIANO KEY MECHANISM.

(Application filed Aug. 3, 1900.)

(No Model.)

2 Sheets—Sheet 2.



Witnesses.

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UNITED STATES PATENT OFFICE.

WILLIAM C. ELLIS, OF WORCESTER, MASSACHUSETTS; MARY H. ELLIS, EXECUTRIX OF SAID WILLIAM C. ELLIS, DECEASED, ASSIGNOR OF ONE-HALF TO SAMUEL MAWHINNEY, OF SAME PLACE.

PIANO KEY MECHANISM.

SPECIFICATION forming part of Letters Patent No. 670,151, dated March 19, 1901.

Application filed August 3, 1900. Serial No. 25,726. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM C. ELLIS, a citizen of the United States, residing at Worcester, in the county of Worcester and State of Massachusetts, have invented certain new and useful Improvements in Piano Key Mechanism, of which the following, together with the accompanying drawings, is a specification sufficiently full, clear, and exact to enable persons skilled in the art to which this invention appertains to make and use the same.

My present invention relates to an improved construction and manner of mounting the manual-keys in a pianoforte or similar manual-played musical instrument, also to the manner of combining and securing the key-frame in the instrument-case.

The objects of this invention are, first, to provide an efficient and desirable key construction and fulcrum-pivoting appliances therefor that will render the keys steady and firm on their fulcrum-support, yet free and light of touch in their operation; second, to provide a series of intermediate key-guides or means for the lateral support of the keys embracing the sides thereof; third, to provide a manual-key with means for varying its width between the guides and for taking up lateral looseness or backlash between the side guiding-surfaces, and, fourth, to provide a simple arrangement and means for securement that will facilitate the convenient and ready removal and replacement of the key-frame and manual relatively to the piano-case or key-bottom, as more fully hereinafter explained. I attain these objects by the mechanism illustrated in the accompanying drawings, wherein—

Figure 1 represents a vertical section of the key-frame, showing the key in side elevation. Fig. 2 is a plan view of the keys. Fig. 3 illustrates a modification in the manner of securing the key-guides in the frame. Fig. 4 is a plan view of the key-supporting frame and a few of the manual-keys as arranged in the piano-case. Fig. 5 illustrates in detail, on larger scale, the means for and manner of supporting the key-fulcrums. Fig. 6 shows the cap-plate. Fig. 7 represents a vertical section at the front of the key-guide; Fig. 8,

a side view of the bushing-faced portion of the key, and Fig. 9 a bottom view of that portion of the key which is laterally recessed.

Referring to the drawings, A denotes the key-frame, consisting of a horizontally-rectangular structure formed of two longitudinal rails *a a'*, united by transoms *b* at the ends and at intermediate positions and adapted to rest upon the key-bottom, table, or bed C, which is a usual part of the piano-case. Upon this key-frame there is provided a raised longitudinal bar or fulcrum-rail A', that forms a part of the key-frame and has rigidly secured thereon the upwardly-projecting fulcrum-bearing plate or plates D D', which are made of metal, brass, fiberoid, or similar hard material. Said plates extend transversely to the keys and lengthwise of the fulcrum-bar A' and are fitted with longitudinal pivot-seating grooves 3 and footing-grooves 4 at or near their edges, and their upwardly-projecting edges are fitted with a series of recesses or notches 5 at intervals corresponding with the scale or spacing of manual-keys for receiving the key-levers. I prefer to employ two pivot seat-plates secured to the fulcrum-bar in oppositely-faced inclined positions, as illustrated, as such disposition affords convenient access to the cap-screws. The notched edges of the plates stand above the top of the bar A', and the notches 5 in the two plates are in corresponding alignment for embracing the key-levers. The front plate D supports the white keys and the rear plate D' supports the black keys.

In accordance with my invention the manual-keys K are severally composed of three united portions or sections—viz., a front end or head portion K', of wood, having the finger-surface ivory or ebony thereon, a rear end portion K³, of wood, and an intermediate portion K², consisting of a strong wire or metal rod having its ends inserted into and rigidly secured in the respective parts K' and K³, uniting the same and forming a complete key-lever, as illustrated. The rod K² is provided with a fulcrum-pivot F, which consists of a wire pin driven through and rigidly fixed in a hole drilled in the rod, the ends of said pivot-pin projecting laterally at the opposite

sides of the rod in horizontal position and at right angles to the axis of said rod. (See Figs. 2 and 5.) In mounting the keys upon their fulcrum-support the pivot-pins F are seated
 5 in the groove 3 of the pivot seat-plates, preferably without bushings, and are respectively retained in relation thereto and the stiffness of the joint regulated by an individual bifurcated cap-plate E, attached to the bar by a
 10 screw *e*, that passes through holes *d* in the cap-plate and pivot seat-plate and screws into the bar A' in the manner indicated. A wire G may be laid in the groove 4 or the end of the cap-plate bent down, as at 7, as a footing for
 15 said cap-plate in the groove 4.

By the construction of piano-keys with the wire rod at the central part of the key the twisting or warping of the keys by changes in humidity and temperature is obviated, which
 20 in keys of the ordinary form results in the sticking or cramping of the keys. The wire-rod portion K² also admits of a pivot rigidly fixed in the key and having laterally-projecting arms that seat horizontally in the metal
 25 surface of the grooved plate and work therein without requiring cloth bushings. The key is balanced positively and steadily against lateral looseness, but in a way to move freely and with great delicacy of touch in the direc-
 30 tion of its proper operation and is held with greater firmness at the fulcrum-axis, so that any jumping of the key from its fulcrum-seat is absolutely prevented. The joints are held and regulated to give any degree of stiffness
 35 or freedom by turn of the screw *e*.

The keys are all supported level and at the same fulcrum-axis alinement, obviating the usual requirement of washers or paper packing under the keys, while attaining a very
 40 uniform and perfect movement of the action.

The keys thus composed can be readily made to meet the variation between the scale or spacing of the manual and that of the hammer-actuating mechanism by bending or off-
 45 setting the rods K² at a point in rear of the fulcrum F, thus maintaining the fulcrum-axes all at right angles with manual end K' or head portion of their respective keys.

Near the head or front ends of the keys I provide an upright key-guide or separating-guard that consists of a series of flat plates I, fixed in vertical position in or upon a horizontal bar or strip I', fixed in or upon the front rail *a* of the key-frame. Said guide-
 55 plates project upward between the keys, embracing the sides thereof and affording intermediate spaces J, within which the keys rest and move without lateral play, but with sufficient degree of looseness to work free and
 60 with perfect steadiness as regards lateral vibration or rolling tendency.

The line of key-guides I is located in such relation that it will receive the ends of the black keys as well as the white keys. (See
 65 Figs. 1 and 2.)

The sides of the keys adjacent to the guide-plates I are recessed, as at *r*, and provided

with surface-bushings of thin felt, cloth, or similar soft fibrous fabric M, that rubs against the guide-plate surfaces. Within the key-
 70 body, at the inner side of the bushing fabric, I provide a screw-stud *m*, that can be turned inward or outward to vary the lateral dimension of the key at the point where it plays between the guide-plates I, thereby affording
 75 means for regulating the closeness of fit or for taking up any wear or backlash in the guiding-spaces. The bushing fabric is provided with a small hole *m'*, through which to insert a tool or driver for adjusting the screw-
 80 stud *m*, variation in the bearing width being effected by turning the stud in or out, as desired.

The flat key-guides I present sufficient width of surface to prevent any tendency of
 85 wearing a groove into the bearing-faces, such as occurs with a pin or similar guide.

The key-guide may be made with a base-bar I', of metal or other rigid material, secured to the front of the front bar *a* of the key-frame,
 90 as in Figs. 1 and 2, or with a base of wood or similar material let into and secured in a groove formed in the key-frame, as at I², Fig. 3.

The soft pad P beneath the keys K is best
 95 made as a long strip of fabric cut out with a series of notches and fingers to lie between the upright guide-plates I upon the top surface of the rail *a* and bar I'.

The hammer-actuating devices or lifters L
 100 can be combined with the rear ends K³ of the manual-keys in any well-known or suitable manner.

For detachably securing the key-frame A in position upon the bed or key-bottom C, I
 105 provide screw-studs *n*, that screw into and project up from the bed C, said studs having wire cross-heads that engage holes formed in the rear side of the key-frame. At the front of the key-frame I provide a central screw-
 110 stud *t*, having a wire cross-head fitted with a hook at one end and its other end adapted to engage a recess in the key-frame for securely locking said frame in opposite conjunction
 115 with the studs *n*.

That part of the case in front of the keys commonly called the "key-strip" C' is here-
 in provided with two vertical dowel-pins *x x* and a central eye *o* on its inner side. The hooked head of the stud *t* engages in said eye,
 120 and thereby locks or secures the key-strip in place, the locking and unlocking being performed by the same act that locks and unlocks the key-frame. By the construction here shown the key-frame and manual can
 125 be at any time readily removed, thus affording facility of access to the under parts for cleaning out dust that accumulates beneath the keys, for repairs, or for any desired pur-
 130 pose, and the ready and accurate replacement of the removed parts quickly effected.

To remove the key-frame and manual from the case, it is simply necessary to turn the stud *t* sufficient to swing its cross-head from

the engaging notch and the hooked end from the eye *o*. The key-strip can then be lifted from the dowel-pins *x*. The front edge of the key-frame can then be raised and said frame drawn bodily forward away from the studs *n* and from the case. For replacing the key frame and strip this operation is reversed.

What I claim, and desire to secure by Letters Patent, is—

1. A piano-key comprising a head-section of wood carrying the fingering-surfaces, a rear end section of wood or equivalent light material on which the action-lifter is stepped, and an intermediate portion consisting of a metal rod having its ends rigidly secured in said end sections, said rod provided with a transversely-disposed pivot-pin fixed therein, as set forth.

2. The manual-key, comprising the end portions and intermediate metal-rod portion, provided with a laterally-projecting pivot-pin fixed therein, in combination with a key-frame, a longitudinally-grooved pivot seat-plate attached to said key-frame, said plate having an edge recess for the reception of the key-rod with its pivot resting in said groove, a cap-plate confining said key-pivot in said groove, and a screw for retaining said cap-plate.

3. In a piano key-action, a key-fulcrum support comprising a pair of oppositely-inclined pivot seat-plates having recessed top edges and horizontal grooves, the key-levers comprising end portions and a metal-wire central portion carrying a transverse horizontal pivot fixed therein, said pivot horizontally disposed in said seat-plate groove, and means for retaining said pivots in working connection with said plates.

4. The combination, of the key-frame, the manual-keys having a surface bushing of soft fabric on their opposite sides, and the key-guides consisting of thin flat upright plates standing adjacent to and embracing the sides of the keys, substantially as set forth.

5. In a piano key-action, the combination, with the manual-keys and key-frame, of a guide for lateral support of the keys, consisting of a series of vertically-projecting flat plates disposed between the front end portions of the respective keys, said plates rigidly fixed in a bar or base-piece attached to the key-frame, substantially as set forth.

6. In a piano key-action, the combination, of manual-keys respectively composed of end

portions and an intermediate connecting wire or rod portion, having a pivot fixed therein, a key-frame comprising a fulcrum-bar, a longitudinally-grooved transversely-recessed pivot seat-plate supported on said fulcrum-bar, the key-pivots seated in the groove of said pivot seat-plate, the bifurcated cap-plates for retaining said pivots, and a key-guide consisting of upright plates adjacent to the sides of the keys and affording spaces within which the front end portions of said keys move up and down, substantially as set forth.

7. In a piano key-action, the combination, of a piano-key, a key-guide consisting of upright flat plates disposed adjacent to the sides of the key, and means embraced within the key for varying the lateral dimension of that part of the key that moves between the guiding-faces of said key-guiding plates, for the purpose set forth.

8. The manual-key recessed on its sides, and having a soft bushing fabric surfacing said recesses; in combination, with the fixed vertical guide-plates, and an adjusting screw-stud within the key-body underneath said bushing fabric, adapted for regulating the lateral width of the key with respect to the space between said guide-plates.

9. In combination with the key bottom or bed in a piano, and the removable key-frame supporting the manual-keys; the screw-studs *n* provided with cross-heads that enter holes in the rear edge of the key-frame, and the screw-stud *t* having the cross-head wire that engages a horizontal lug or recess at the front side of said key-frame, for the purpose set forth.

10. In combination with the key bottom or bed in a piano, the removable key-frame supporting the manual-keys; and the removable key-strip having the eye *o*, and the dowel-pins *x x*, the screw-studs *n n* supported in the bed and engaging the rear side of said key-frame, and a locking-stud having a hooked cross-head, one end thereof adapted for securing said key-frame, and its other end to hook into said eye for securing said key-strip, substantially as set forth.

Witness my hand this 28th day of July, 1900.

WILLIAM C. ELLIS.

Witnesses:

CHAS. H. BURLEIGH,
ELLA P. BLENUS.