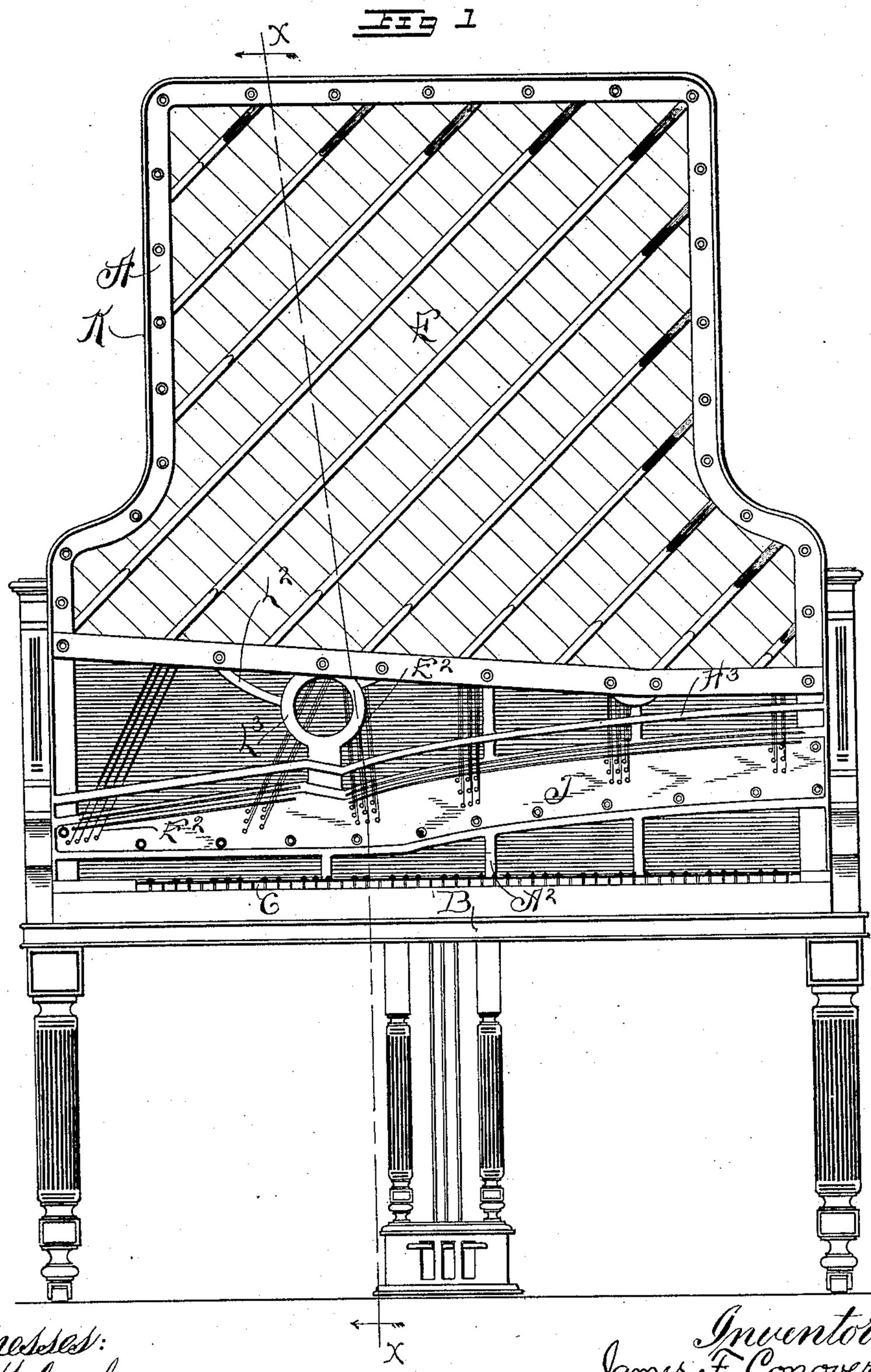
(No Model.) 3 Sheets—Sheet 1.

J. F. CONOVER.

PIANO.

No. 574,711. Patented Jan. 5, 1897.

Fig 1



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(No Model.) 3 Sheets—Sheet 2.

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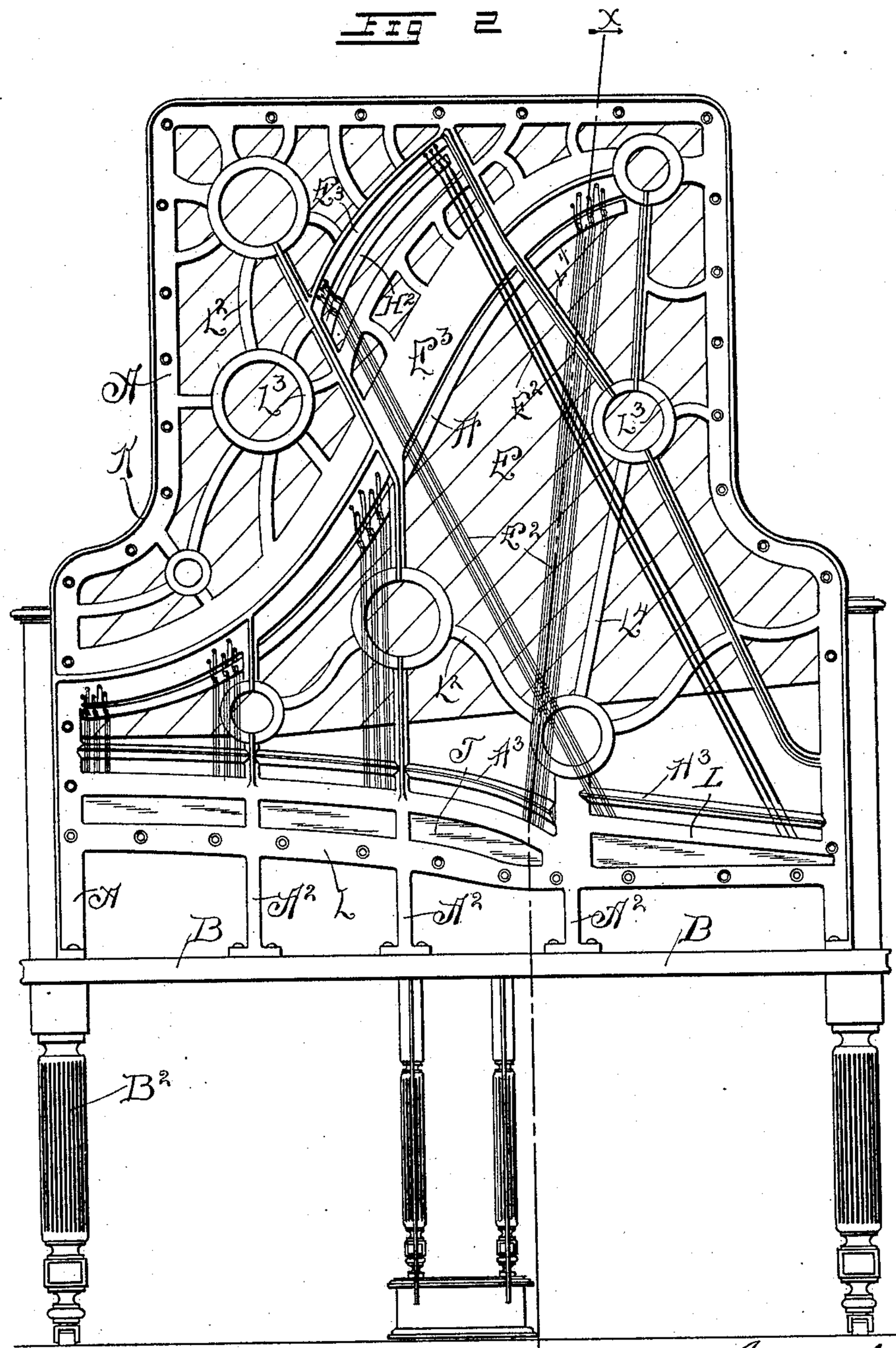
Fig 2



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(No Model.) 3 Sheets—Sheet 3.

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Fig 3

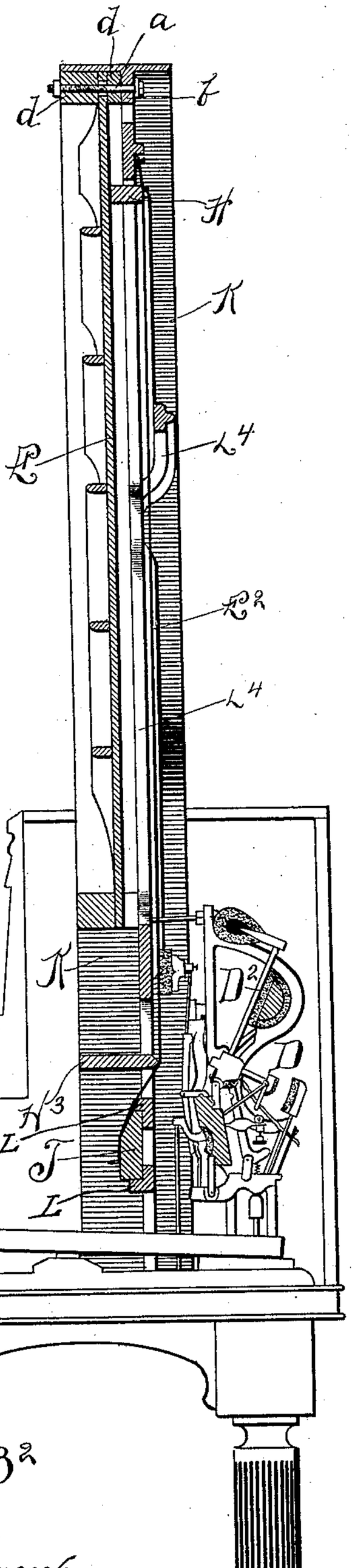
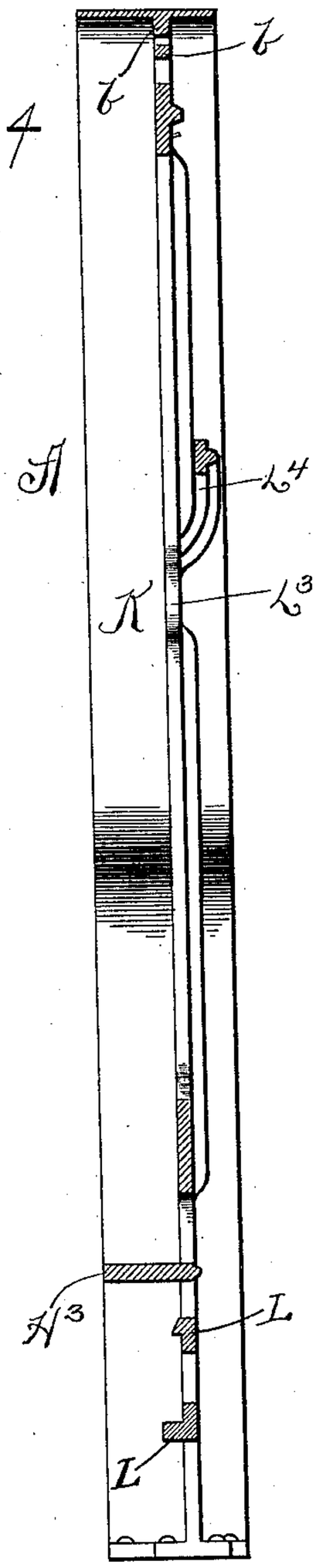


Fig 4



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UNITED STATES PATENT OFFICE.

JAMES F. CONOVER, OF CHICAGO, ILLINOIS.

PIANO.

SPECIFICATION forming part of Letters Patent No. 574,711, dated January 5, 1897.

Application filed February 10, 1896. Serial No. 578,720. (No model.)

To all whom it may concern:

Be it known that I, JAMES F. CONOVER, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Pianos, of which the following is a specification.

The object of my invention is to produce a musical instrument occupying small floor-space with greatly augmented tone of purer musical quality and greater durability; also to provide a cast string plate or frame of such a construction and arrangement that artificial strain of shrinkage in casting shall be relieved, and thus avoid or overcome the tendency of the plate or frame to break during cooling and before or after the tension of the strings is added.

To this end my invention consists in certain features of construction, arrangement of parts, and combinations to be particularly described, and pointed out in my claims, reference being now had to be accompanying drawings, in which—

Figure 1 is a front view of the piano with most of the casing omitted. Fig. 2 is a similar rear view. Fig. 3 is a section on the line *x x* of Figs. 1 and 2. Fig. 4 is a like section showing the string-plate divested of all attachments.

I will first proceed with a description of the arrangement and combination of the action, the key mechanism, and the disposition of the sounding-board. In this connection it is my object to so construct and arrange the parts as that the vibrations of the strings and those of the sounding-board are projected forwardly in the direction in which the sound should travel to the listeners; also to dispose all of the tone-producing parts above the key-bed and in the temperate zone of the room and thereby attain certain advantages about to be particularly set forth.

A vertical string plate or frame A, to be particularly described hereinafter, is shown as supported by short posts A^2 above a key-bed B, itself supported at a proper height above the floor by legs B^2 or in any suitable manner. Keys C, Fig. 3, of a manual keyboard fulcrumed upon this bed pass beneath the string plate or frame and in the rear of its plane connect directly with any suitable action D, whose hammers D^2 oscillate forwardly in striking the strings. The sounding-board E lies wholly above the keys, covers the principal part of the string plate or frame, and is marginally secured thereto in a manner about to be described.

The strings or wires E^2 are secured to the hitch-bars E^3 in the ordinary manner and pass thence downward over vibrating bridges H and H^2, secured to the sounding-board E, past the impact-line of the hammers, over the stationary bridge H^3, a part of the string plate or frame A, and are secured to the wrest-plank J by means of pins in the ordinary manner. In front of the plane of the strings is the sounding-board E, marginally secured to the string plate or frame. The vibrating bridges H and H^2 are attached to the sounding-board only and vibrate with it.

The sounding-board being located in the front of the piano and having its strings on the rear side thereof and the hammers arranged to oscillate forwardly, said hammers are thus adapted for operation at the rear of the sounding-board by the performer in front of the piano. It will also be observed in my improved construction that the keys located above the key-bed are extended from the front of the piano backward toward the rear thereof under the sounding-board and string plate or frame directly to the action D and are directly connected therewith, so that the movement of the keys is directly communicated to the action, thereby responding easily and accurately to the touch.

As all of the tone-producing parts are disposed above the key-bed and occupy the temperate zone of the room, the instrument remains in tune and in general good condition for a longer period and is not subjected to injury from the strong currents of air, with sudden changes of humidity and temperature, which circulate near the floor and cause great damage to the thin and highly-seasoned sounding-boards that extend down to the floor in the ordinary upright piano. The sounding-board and the vibratory bridge by which the vibrations of the strings are imparted to the sounding-board being thus located above the key-bed, the sound is directed forward above the heads of the listeners and player and above and over other usual obstructions.

I will now proceed to describe the character and construction of my improved special form of string plate or frame for pianos and will preface such description with a brief statement of certain well-known conditions which prevail in the casting or molding of iron and which conditions have heretofore presented difficulties in the casting or molding of string plates or frames for pianos.

In the present form of plate or frame as now constructed a considerable percentage break or become distorted while cooling in the molds, and others, which appear to be well cast, also break from a concussion before or after the strain of the strings is added. In order to overcome this serious disadvantage, I provide the form of plate or frame which will now be particularly described.

The string plate or frame A is a one-piece casting consisting of a broad marginal band or web K, of an inverted-U shape when secured in position, which band or web is approximately perpendicular to the general plane of the string plate or frame and extending transversely to and across the said general plane projects beyond each side or face of the same, and also consisting of the hitch-bars E^3, the wrest-plank bars L for holding the wrest-plank J, the stationary bridge H^3, and a series of curved braces L^2. The braces are curved in order that they may yield under the strain of cooling contraction, straightening out under a pulling strain and increasing their curvature under a pushing strain, and thus prevent any dangerous stress or artificial strain upon the plate or frame which causes their breakage in casting and also before and after the strain of the strings is added. If deemed necessary, rings L^3 may be made integral parts of the braces at several points for the reason that such rings readily accommodate themselves by slight distortion to either thrust or pull in any direction or to any combination of such forces.

I have also shown in the drawings a form of string plate or frame provided with straight connecting-bars L^4, which are employed in conjunction with the curved braces and interposed rings. The curved braces, the rings, and straight bars L^4 serve to connect the hitch-bars with each other and with the marginal band or web, and also with the wrest-plank bars, and all of these parts, together with the stationary bridge, being integrally cast constitute the string plate or frame.

The tendency of the string plate or frame of the ordinary piano to bend and buckle under the strain of the strings necessitates the use of heavy wooden frames or timbers, to which the string plate or frame is secured.

It will be apparent, with my improved form of string plate or frame, that the usual heavy wooden backing is not required, as the broad marginal band or web K of the string plate or frame extending at approximately right angles to the general plane of the plate or frame and across said plane, and also beyond each side or face thereof, being practically inflexible edgewise, resists any tendency of the string plate or frame to spring or buckle under the strain or tension of the strings. As the broad band or web K is secured firmly and rigidly to the key-bed and projects upward therefrom in its inverted-U-shaped form, the sounding-board E and other tone-producing elements are all disposed above the key-bed, as previously stated, and held rigidly in this position, the sounding-board being secured to the marginal band or web K by bolts *a*, Fig. 3, passing through projections *b* and clamping the board between the blocks *d*.

By "broad marginal band or web" I mean a web or band of such a width as to present such a sufficient cross-section of the metal of the band or web as shall provide a practically inflexible resistance to the strain resulting from the tendency of the plate or frame to buckle.

Having thus described my invention, what I claim as new therein, and desire to secure by Letters Patent, is—

1. A piano-string plate or frame having a broad marginal web or band perpendicular to the general plane of the frame, hitch-bars and curved braces integrally connecting the web and hitch-bars, substantially as and for the purpose set forth.

2. A one-piece, cast, piano-string plate or frame having a broad marginal web or band perpendicular to the general plane of the frame, and extending beyond each side or face thereof, hitch-bars and curved braces extending laterally from each side of the latter to connect them integrally with the corresponding portions of the web or band.

3. A one-piece, cast, piano-string plate or frame having a marginal web or band perpendicular to the general plane of the frame, hitch-bars and braces connecting the latter to said web, each of said braces having a sinuous or curved portion adapted to yield slightly and thus relieve the great strain due to cooling contraction in casting.

4. A one-piece piano-string plate or frame having a marginal web or band perpendicular to the plane of the frame as a whole, hitch-bars extending across the plate or frame, braces connecting the web and hitch-bars and rings intersecting said braces whereby said rings are adapted to yield in the cooling of the casting to relieve artificial strain.

5. The combination with a key-bed, of a string plate or frame and a sounding-board, both arranged above the bed, a manual keyboard, keys mounted above the bed and passing beneath said plate or frame and sounding-board; and hammers arranged to be operated by said keys.

6. The combination with a key-bed, of a string plate or frame and a sounding-board, both arranged above the bed, a manual key-

board, keys mounted above the bed and passing beneath said plate or frame and sounding-board and an action with which the keys are directly connected.

7. The combination with a key-bed, of a string plate or frame and a sounding-board, both arranged above the key-bed, a manual keyboard, keys mounted above the bed and passing beneath said plate or frame and sounding-board and hammers arranged to be operated by said keys and to strike forwardly.

8. The combination with the key-bed, of a broad marginal web or band of inverted-U shape, which is perpendicular to the general plane of the frame, having its ends fixed upon the bed and projecting upwardly from said bed, hitch-bars and suitable braces connecting the hitch-bars to the web the whole being cast in a single piece.

9. The combination with the key-bed, of a broad marginal web or band of inverted-U shape, which is perpendicular to the general plane of the frame, having its ends fixed upon the said key-bed and extending vertically upward therefrom, hitch-bars, braces extending from the hitch-bars to the web or band and cast integrally with both and a sounding-board parallel to the plane of the frame and fixed to the marginal portion of said web or band.

10. The combination with the key-bed of a one-piece, cast, string plate or frame having a broad marginal U-shaped web or band perpendicular to the general plane of the frame and having its ends fixed to the bed, hitch-bars and braces supporting the hitch-bars from said web or band, said braces having curved portions adapted to relieve artificial strain of the plate or frame by changing their curvature in the cooling of the casting.

11. A string plate or frame consisting of a marginal web or band perpendicular to the plane of the plate or frame as a whole, wrest-plank bars, hitch-bars, and a network of braces connecting the hitch-bars to the web and wrest-plank bars and having curved portions between their points of attachment adapted to change their curvature and thus relieve artificial strain due to contraction in the cooling of the casting.

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

JAMES F. CONOVER.

Witnesses:

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L. W. BULKLEY.