(No Model.) 3 Sheets—Sheet 1.

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PIANO KEYBOARD.

No. 497,426. Patented May 16, 1893.

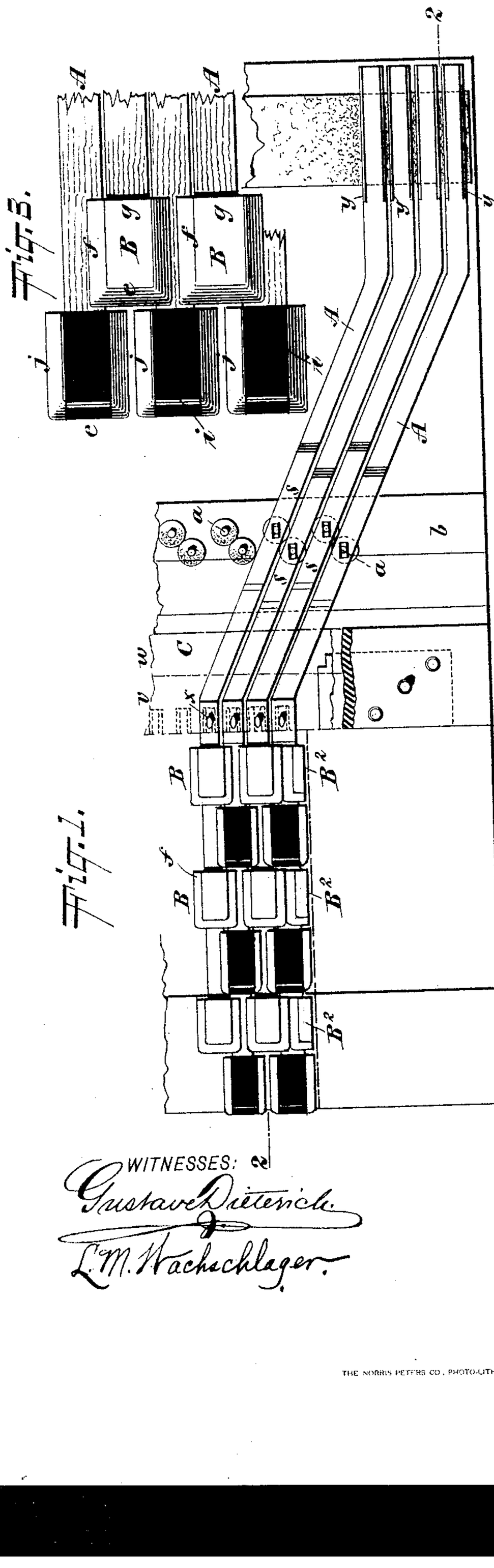

Fig. 1.

Fig. 3.

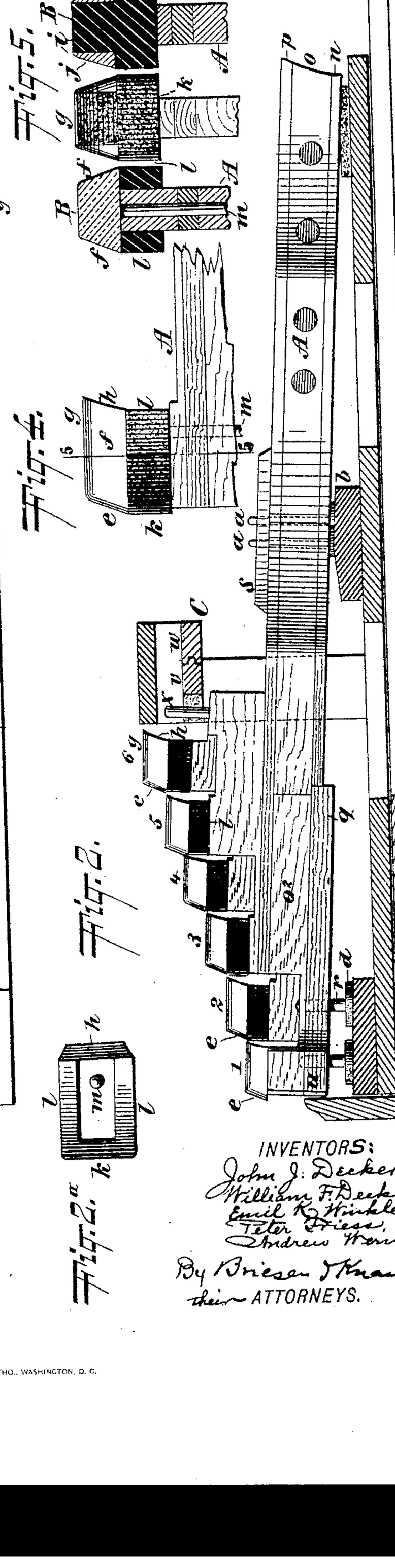

Fig. 4.

Fig. 2.

Fig. 2a.

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(No Model.) 3 Sheets—Sheet 2.

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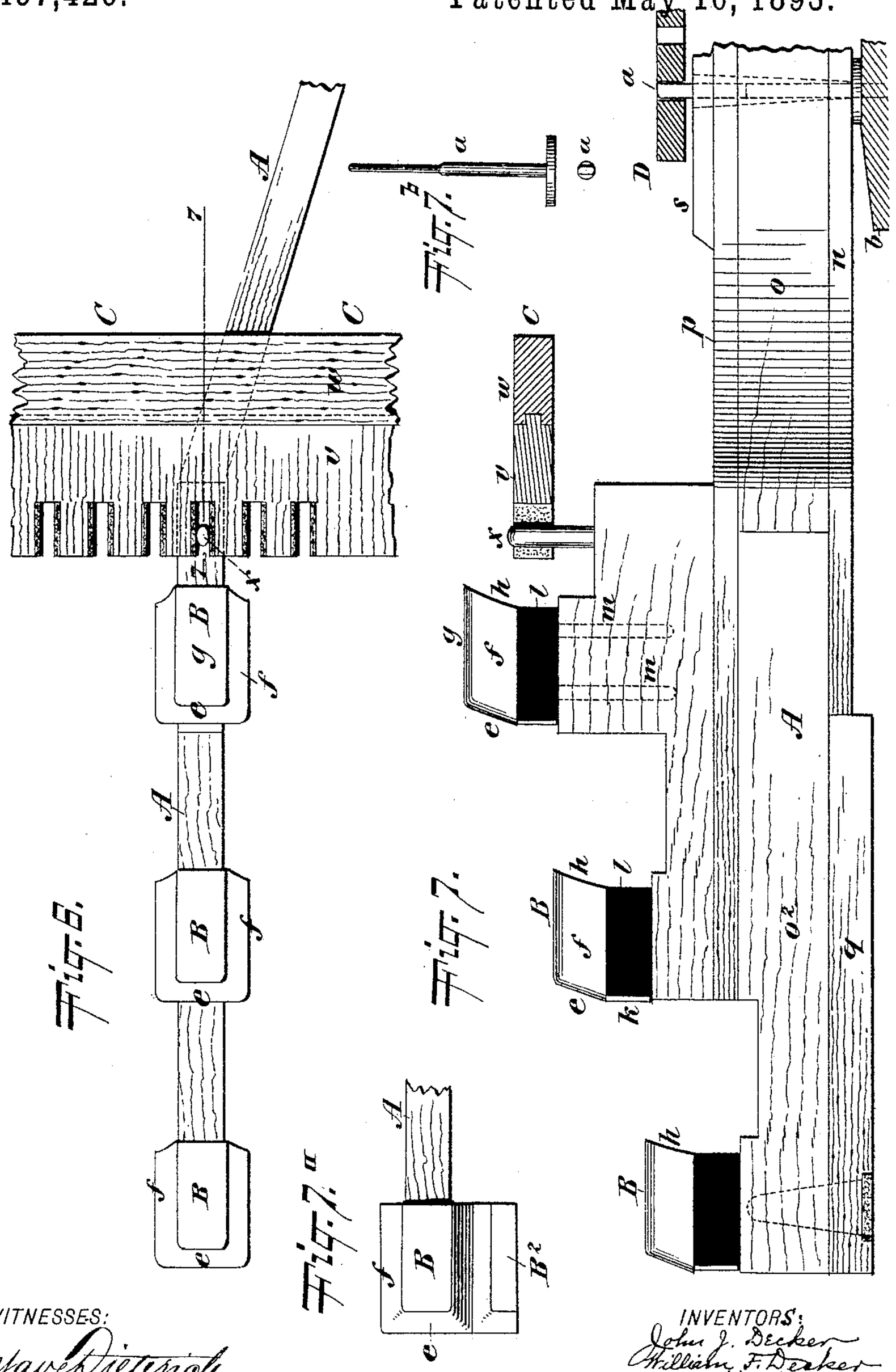

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PIANO KEYBOARD.

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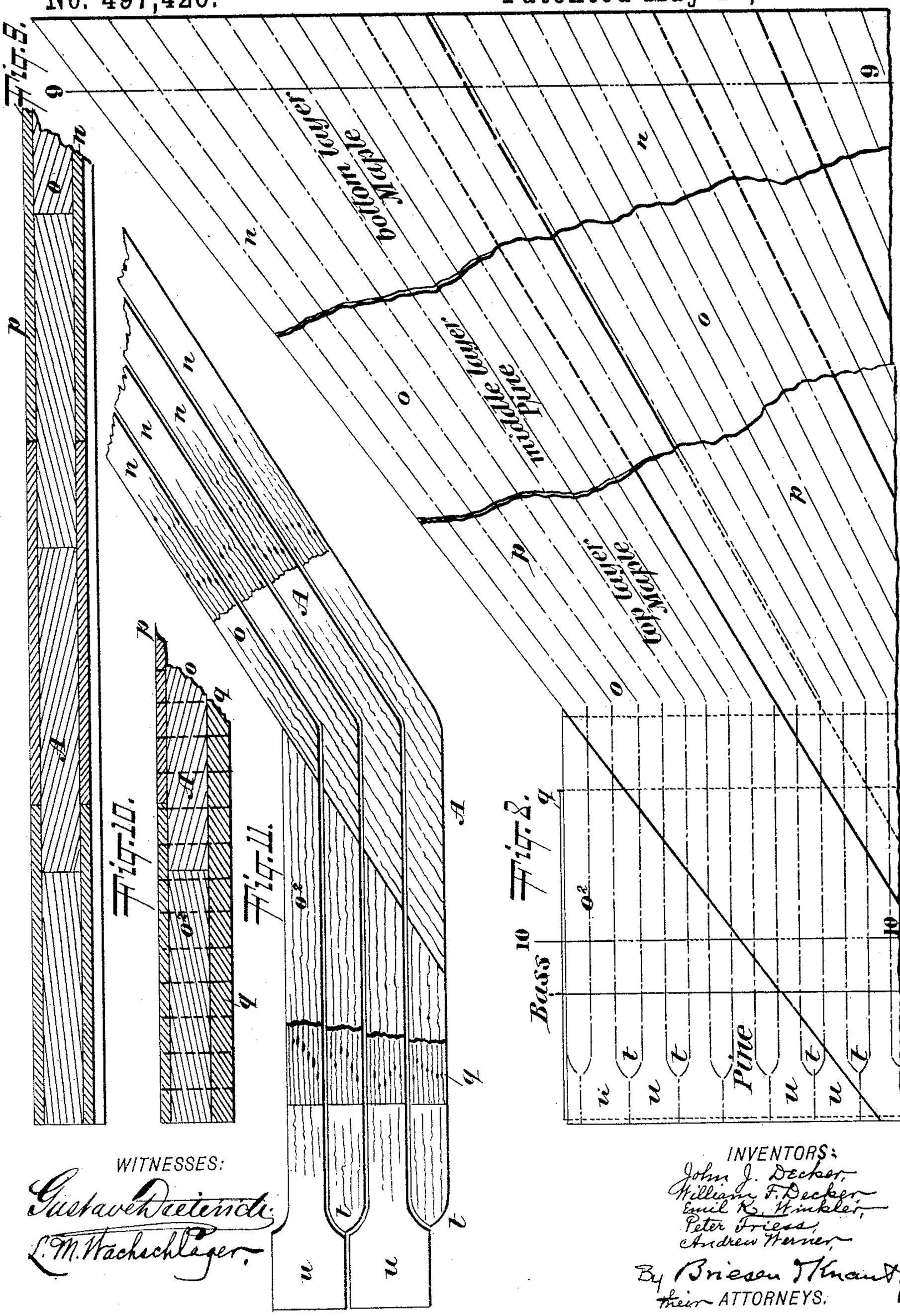

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PIANO-KEYBOARD.

SPECIFICATION forming part of Letters Patent No. 497,426, dated May 16, 1893.

Application filed September 28, 1892. Serial No. 447,153. (No model.)

To all whom it may concern:

Be it known that we, JOHN JACOB DECKER, WILLIAM FREDERICK DECKER, residents of the city, county, and State of New York, EMIL KARL WINKLER, a resident of West Orange, Essex county, State of New Jersey, and PETER FRIESS and ANDREW WERNER, residents of the city, county, and State of New York, have invented an Improved Piano-Keyboard, of which the following is a full, clear, and exact description.

This invention relates to sundry improvements in the keyboard known as the Janko keyboard, being the keyboard described more fully in Letters Patent No. 474,016, and in the Letters Patent that are mentioned therein. In constructing the Janko keyboard in accordance with the Letters Patent previously granted it was found that for the purposes of actual manufacture and most economical assemblage of the parts thereof, many details of improvement were desirable.

The present invention consists in improvements in the touch-plates and in the key levers and in the parts connected therewith, all as hereinafter more fully described.

Reference is made to the accompanying drawings, wherein—

Figure 1 represents a plan or top view of several keylevers and touch-plates constituting the present invention. Fig. 2 is a side view of one of said keylevers, showing the touch-plates of the adjoining keylever also in side view and the supporting and guide portions in section. Fig. 2^a is a bottom view of one of the touch-plates. Fig. 3 is an enlarged top view of several of the touch-plates; Fig. 4 an enlarged side view of one of the touch-plates; Fig. 5 a cross-section on the line 5—5 Fig. 4. Fig. 6 is a plan or top view of one of the keylevers and of the guide-rail above the same. Fig. 7 is a side view of the same partly in section. Fig. 7^a is a top view of part of an end keylever. Fig. 7^b is a front view of a center or pivot-pin. Fig. 8 is a diagram or top view showing the multiple board out of which the keylevers are sawed. Fig. 9 is a cross-section of said board on the line 9—9 Fig. 8. Fig. 10 is a cross-section on the line 10—10 Fig. 8; and Fig. 11 is a bottom view of a series of keylevers, parts being broken away.

In the accompanying drawings the letter A represents keylevers of the Janko keyboard, and the letter B are the touch-plates carried by said keylevers, said touch-plates being arranged step-shaped, as previously described in the Janko patents.

a are the pivots of the keylevers, which project from a bolster *b*. These pivots pass through slots in the keylevers and allow them to rock from the elevated position shown in Fig. 2 to a lower position in which they would touch the cushion-stops *d* under their front ends. It will be seen from Fig. 2 that each keylever A in the construction here shown rocks on the bolster *b*, the surface of which bolster is lower than the surface of the lowermost touch-plate carried by each keylever. In other words, each keylever has its pivotal support lower than its lowest touch-plate. The result is that the front end of each keylever moves when depressed in an arc of a circle, so that its touch-plates are carried farther away from the adjoining touch-plates of the adjoining levers than would be the case if the pivot were higher. In this connection and in order to permit the touch-plates to be brought closer together than otherwise they could be where the pivot is below the lower touch-plate, the first feature of invention consists in constructing each touch-plate with a pronounced front bevel or slope *e*, which bevel or slope extends all the way down throughout the height of the touch-plate proper. It will be easily understood from an inspection of Fig. 2 that when any of the touch-plates in the second, third, fourth, fifth and sixth rows are depressed, these bevel edges *e* will permit them to remain close together. This would not be the case if the front edges were rounded or straight up and down, as heretofore.

Fig. 5 shows that each touch-plate B has its sides *f f* also beveled or sloped, the slope extending from top to bottom of the touch-plate proper. This bevel *f* serves, in the first place, to produce a proper shading of distances or spaces between the touch-plates when they are looked upon by the player, as from above (see Fig. 3), and in addition prevents any part of the finger of the player being caught

between the touch-plates while in the act of depressing one between the other two, and permits also of a larger top surface *g* of the touch-plate than is possible with the rounding of the side edges, which was heretofore proposed. In our present construction of touch-plate the upper surface is substantially flat and broad.

We are of course aware that in an ordinary piano keyboard the black keys have frequently been provided with sloping sides, and cannot claim as our invention the broad idea of sloping the sides of piano keys; but it will be observed that in an ordinary piano where this slope is perhaps seen on the black keys, said black keys are not contiguous to one another, but are separated by portions of the white keys; while in our present invention the keys which have the side bevels *f* are contiguous to each other, and the bevels produce the specific effects on such contiguous keys that have heretofore been specified, which effects are novel and of considerable utility.

Fig. 4 shows that the rear edge *h* of each touch-plate has an inward bevel or scooping out which leaves the rear edge *h* almost parallel with the front bevel edge *e*. This rear bevel will, when the keylever is depressed, allow the depressed touch-plate to move downward and forward behind the non-depressed touch plates, and permits the touch-plates to be set closely together so as not to cause the keyboard to be broader than absolutely necessary.

It need not here be stated that in the Janko keyboard, upon which this invention is an improvement, several of the keys are black, or of dark color, and others white, or of light color. So far as the black touch-plates are concerned, we construct them, in accordance with the present invention, with a central body *i* of black matter—say celluloid—and with side cheeks *j* of white or light matter—say also celluloid. This is clearly shown on the right-hand key which is represented in Fig. 5 of the drawings, and is also perceptible from the front row of keys in Fig. 3. The advantage of having the sides of the black keys made white is that the black keys do not seem to run into one another, but are distinguishable to the eye of the player by the intervening white narrow streaks that are formed by the contiguous white cheek-pieces *j j*. In other words, the white cheeks *j j* give the proper shading and distinguishing line to each black touch-plate. These touch-plates when made of celluloid (which is the preferred construction) are of celluloid throughout, each white touch-plate being a complete block of celluloid, as shown on the left-hand key in Fig. 5, and each black touch-plate being a complete and solid black mass of celluloid provided with the white cheek-pieces *j*. This construction is much to be preferred to the mere celluloid lining heretofore proposed for piano touch-plates, especially since it avoids having detachable pieces at the front ends of the levers, which may at times get loosened, or which may be caught by the fingers of players, when passing the hands over the touch plates.

Of course when in this description we use the words "black" and "white" as the distinguishing colors of different touch-plates, any other dark color instead of black or any other light color instead of white may be employed.

Fig. 2ª represents a bottom view of one of the touch-plates, showing the front apron at *k* and the side aprons at *l l*. These side aprons are also clearly shown in Figs. 4 and 5 of the drawings. The object of the side aprons is to serve as finger protectors between the touch-plates; in other words, to prevent the fingers being pinched by getting between a depressed and a non-depressed touch-plate, because the apron of the non-depressed touch-plate will protect the finger from getting under the latter.

Each touch-plate B is rigidly attached to one or more downwardly projecting (preferably) metallic pins *m* (see Fig. 5), which pins extend into holes that are drilled into the key levers. The key levers are in their cross-section narrow and ledge-like. The pins *m* on the touch-plates by entering into these key levers help to stiffen the same laterally and to prevent them from warping and breaking. At the same time they give a firm support to the touch-plates. The pins *m* may be perfectly smooth, as represented in Figs. 5 and 4, or they may be screw-threaded; their upper ends are firmly embedded in the mass of which the touch-plates are composed and ought to be immovable in said touch-plates.

The key levers A A of a piano-forte adapted to receive the Janko keyboard are mainly arranged as shown in Fig. 1; that is to say, they are provided with forwardly projecting front portions and with body portions that incline or diverge toward the hammers which are to be struck. On an upright piano these key levers are shorter than on a grand, but the same principle of arrangement prevails in all kinds of instruments, whether upright, square or grand. So far as these key levers are concerned, it is important that they should be of such a construction that they cannot readily warp and of such shape and size that one will never interfere with the other. Nevertheless each key lever is different in form from the adjoining key lever; they are not exactly alike except in a few instances, and therefore it is difficult to properly shape these key levers for their respective places. We avoid this difficulty, by forming all the key levers of the whole action of one instrument of one compound board. Fig. 8 represents a top view of one end of this compound board, showing by dotted lines how the key levers diverge and how they lie near one another in that board. That is to say, we prepare a board in manner hereinafter described of proper length, breadth and outline, and out of this board by means of a saw

or saws we cut out the different key levers, so that each key lever when in the instrument will occupy the same position with reference to its neighbors which it did occupy in the original board before the sawing took place. By this means we are enabled to insure the proper form of each key lever and its proper relation to its neighbors, so that no one key lever will be wider than it ought to be or occupy more space between its neighbors than it ought to occupy; for even if the sawing should be careless and the operator should make a cut more to one side than to the other and thereby produce a bulge on one key lever, he would at the same time produce a corresponding recess in the adjoining key lever into which that bulge would always properly fit. Hence even with unskilled labor we are prepared by this arrangement to produce the action in such perfect form that each key lever will find its proper place and will be free from interference by others.

In order to avoid warping of the key levers we construct the board out of which they are cut of several layers, to-wit, three main layers. The lowermost of these layers, *n* (see Fig. 9), is of maple, or analogous stiffening wood; the central layer, *o*, is of pine, or analogous body wood; the upper layer, *p*, is again of maple, or analogous stiffening wood. These three boards which as Fig. 10 shows are of different thicknesses, the pine center being thickest, are glued together in manner indicated in Fig. 9, and after that the key levers are sawed out of the compound board in manner indicated by the dotted lines in Fig. 8. The maple facings of the compound board should cross their grain so as to impart additional strength to the finished lever and to prevent warping. The pine portion *o* may be made of several converging sections at the rear portion, which converging sections are indicated by very heavy lines in Fig. 8, and these converging sections are joined to a front pine portion o^2 (see Fig. 8) at the ends of the keyboard, so that the end key levers (being the ones at the extreme ends of the keyboard) carry these front pine portions o^2 adjoined to the nearest part *o* of the main board. Fig. 11 most clearly shows the pine portion o^2 as joined to the portions *o* of the several levers that are arranged near one end of the keyboard.

We further combine with the keylever constructed as above described a lower brace *q* made of bass wood, or other very soft wood. This brace *q* is most clearly shown in Fig. 7. It extends back from the front of each keylever sufficiently far to protect the recesses or depressions between the touch-plates, thus giving strength to those parts of the keylever which by these recesses or depressions are weakest and most liable to break. In this lower bass brace *q* are the apertures for the front guide-pins *r*, which apertures may, however, also extend into the pine portion of the keylever. This lower bass brace *q* projecting beneath the remaining portion of the keylever, permits the pivot *a* of the keylever to be absolutely higher than it would be were it not for this bass projection, and reduces, therefore, the forward movement of the key in playing. The wood for this bass brace *q* occupies the space underneath the keylevers in front of the lower maple section *n*, as is clearly shown in Fig. 7, and in making the keylevers the board of bass can at the proper place be glued to the under side of the front pine portion, so that when afterward the keylevers are sawed out in manner already described, each will be found to have its bass brace *q* already attached. On top each keylever behind the section that carries the touch-plates is provided a bass button or block *s*, which is called the center button, and which has guide-holes for the pivot-pins *a*, said guide-holes being properly cushioned. The grain of this bass button *s* runs in the direction of the length of each keylever, and is therefore not liable to break out. Moreover, bass wood is so pliable that it can be shaped by pressure to fit the guide-pins to a nicety.

Looking at each keylever from the under side, as in Fig. 11, it will be observed that those keylevers which carry the frontmost rows of touch-plates (being the rows marked 1 in Fig. 2) are made wider at their front ends than the intermediate levers that carry the second row (2, Fig. 2) of touch-plates, so that the front ends of the levers carrying the touch-plates 1 are wide enough to constitute substantially front contiguous touch-plate supports as broad substantially as the touch-plates above them. This configuration is obtained in the act of sawing the multiple board *n o p*, as indicated in Fig. 8, and facilitates the act of sawing, because it avoids all sharp corners, the ends *t* of the shorter levers being rounded, as are the recesses that produce the widened front portions *u* of the other key levers. The advantage of this arrangement is that the longer key levers, being the ones that carry the broad front portions *u*, are made in a single piece and not, as heretofore, provided with additional cheek-pieces to help support the sides of the front row of touch-plates, and being made of one piece united by curvilinear or concave edges with the body of the key lever, the thick front portion *u* is stronger than it would be if the connection were by vertical lines. Again, in the act of sawing, these curvilinear lines can be produced by one continuous motion of the saw, whereas if sharp edges were required, more labor would be needed, the saw having to be stopped in one direction and started anew in another.

The upper guide-rail C is according to this invention made of two woods, of which one is maple, the other bass, the maple being solid and giving resistance; the bass being elastic and allowing itself to be properly shaped. This guide-rail C is more clearly shown in Figs. 6 and 7, in which figures the bass sec-

tion is represented at *v* and the maple section at *w*. The bass section is notched, as will be seen in Fig. 6, to receive in the notches the upper guide-pins *x* that project from the key levers. Heretofore the guide-rail did not have notches, but had apertures or holes. We find that the notches can be easily sawed out and can be nicely cushioned with felt or the like, so as in every way to be exact as to spacing and extent—a feature which in bass wood, which is a compressible wood, can be performed with great nicety; while with perforations the desired exactness could not be so easily obtained, requiring also more labor, and exact cushioning was practically impossible in perforations. These notches in the bass wood section *v* of the guide-rail C are not for the purpose of contacting with anything during the act of playing, but are simply to prevent lateral displacement of the key levers. Of course in lieu of maple, any analogous stiff wood may be employed.

The center-pin or pivot-pin *a* which acts as pivot for each lever is according to another feature of this invention flattened at its upper portion, as indicated by Fig. 7^b of the drawings, which is a face view of one of these pivots. The object of this flattening of the upper portion of the center or pivot-pin is to reduce the width of the slot in the upper portion of the key lever where it embraces the center-pin, thereby allowing more wood in the upper part of the perforated keylever than would remain if the center-pin were throughout cylindrical as heretofore. A further advantage of this construction is that better alignment of the bushing at the upper part of the keylever is permitted and less liability of lateral vibration of the keylever thereby produced.

A further feature of improvement relates to the employment of an additional support for the pivot-pins *a* of the key-levers, especially those keylevers which are near the ends of the action. The pivots near the end of the keyboard support diverging keylevers and are therefore more liable to be laterally strained than are the pivots of the more central keylevers. To counteract this tendency to lateral strain we apply to the pivots at the ends of the action an additional upper rail or brace D (see Fig. 7) which is directly above the bolster *b* and which is perforated to receive the upper ends of the pivot-pins *a*. The perforations in the upper rail D can be formed, and are properly formed, at the same time and by the same tool as those in the lower bolster *b*, so that when the two rails *b* and D are placed in juxtaposition the pins *a* will find exact fittings in them.

The rear end of each keylever, especially for concert grands, where additional length of lever is needed, is lined with leather, as indicated at *y* in Fig. 1, so as to render the keylevers noiseless should there be slight contact in playing.

At each end of the keyboard the keylever which is second from the end and whose touch-plates are aligned with the spaces between the touch-plates of the last keylever, is in accordance with our present invention provided with idle half touch-plates B^2, as indicated in Fig. 1 and also in Fig. 7^a. These idle half touch-plates B^2 are attached to the sides of the regular touch-plates B of the particular keylever in question, and move up and down with these regular touch-plates, and therefore help at all times to fill the gaps that otherwise would have to be left empty or that otherwise would have to be filled by solid projections from the stationary framing. Such solid projections from the stationary framing entering into these recesses are, however, very objectionable, because they interfere not only with the playing, but more particularly with the convenient taking apart of the keyboard and with its restoration after having been taken apart; for it will be readily understood that if the parts B^2 which are attached to the second keylever were stationary projections from the framing, they would overlap the first keylever, and would therefore prevent the first keylever from being taken out, consequently preventing the entire action from being taken apart. This difficulty is entirely obviated by the idle or secondary touch-plates B^2 that are affixed to the primary touch-plates B of the second keylever at each end of the action.

Whenever in this specification we mention a "piano" keyboard or parts thereof, we wish to have it understood that the term embraces analogous uses, such as for organs or the like.

Having thus described our invention, what we claim, and desire to secure by Letters Patent, is—

1. A keylever A combined with a pivotal support and with series of upwardly projecting touch-plates, said pivotal support being lower than the lowest touch-plate, and the touch-plates B having front bevels or slopes *e*, each slope extending from top to bottom of the touch-plate, substantially as herein shown and described.

2. In a keyboard having series of contiguous touch-plates B B whose side edges *f* are made sloping, leaving the top surfaces *g* flat and broad, substantially as and for the purpose specified.

3. In a keyboard the keylever A having series of projecting touch-plates B B, each touch-plate having inwardly beveled or scooped rear edge *h*, substantially as and for the purpose herein shown and described.

4. In a keyboard the keylever A having series of projecting touch-plates B B, each touch-plate having front outwardly extending bevel *e* and rear inwardly extending bevel *h*, substantially as and for the purpose herein shown and described.

5. In a keyboard the keylever A having series of upwardly projecting touch-plates B B, each touch-plate having outwardly extending front bevel *e*, outwardly extending side bevels

f f, inwardly extending rear bevel *h* and upper substantially flat surface *g*, all as specified.

6. In a keyboard the touch-plate B having black central body *i* and white cheek-pieces *j*, substantially as and for the purpose herein shown and described.

7. The touch-plate B provided with and rigidly connected to the downwardly projecting pin or pins *m* and combined with the keylever A which acts as a support for the touch-plate and is perforated to receive the pin or pins *m*, substantially as and for the purpose herein shown and described.

8. The keylever A constructed with the lower bass brace *q* which extends underneath the touch-plates, and recesses between said touch-plates, which bass brace is perforated to receive the front guide-pins *r*, substantially as and for the purpose specified.

9. The keylever A constructed with the top bass button *s* perforated to receive the pivotal pins *a*, substantially as and for the purpose specified.

10. The keylever of a piano-forte action, the same being constructed of the multiple main sections *n o p*, lower bass brace *q*, upper touch-plates B, with intermediate recesses or depressions, and upper bass button *s*, substantially as and for the purpose herein shown and described.

11. In a piano-forte action, the keylevers A A arranged one adjoining the other, combined with touch-plates B B that are arranged in steps substantially as described, the keylevers carrying the touch-plates of the lowermost step 1 having at their front ends the wide portions *u* embracing by concave lines the narrow front ends *t* of the intermediate key levers, all arranged so that the wide portions *u* of alternating keylevers are substantially contiguous, as specified.

12. In a piano-forte action, the guide-rail C constructed of a maple section *w* and of a basswood section *v*, the basswood section constituting the guiding portion of the rail, substantially as herein shown and described.

13. In a piano-forte action, the guide-rail C composed of a maple section *w* and a basswood section *v*, the basswood section being notched along its free edge to form open-ended recesses for the upper guide-pins *x* that project from the keylevers, substantially as herein shown and described.

14. In a piano-forte action, the combination of the keylever A carrying touch-plate or touch-plates, with a stationary pivot-pin *a* and means substantially as described for supporting the same, said pivot-pin being flattened at its upper portion, substantially as and for the purpose herein specified.

15. In a piano-forte action, the combination of the keylevers A with the supporting bolster *b*, upright pivot-pins *a* projecting from said bolster, and upper rail D perforated to receive the upper ends of said pivot-pins, substantially as and for the purpose specified.

16. In a piano-forte action composed of keylevers A A having step-like touch-plates B B in alternate rows, the combination of the second keylever from each end of the action with additional or idle touch-plate sections B^2 which extend over the recesses of the last keylever from the regular touch-plates of said second keylever, substantially as and for the purpose herein shown and described.

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