

(No Model.)

J. A. MACKENZIE.  
MUSICAL INSTRUMENT.

No. 440,601.

Patented Nov. 11, 1890.

Fig: 1.

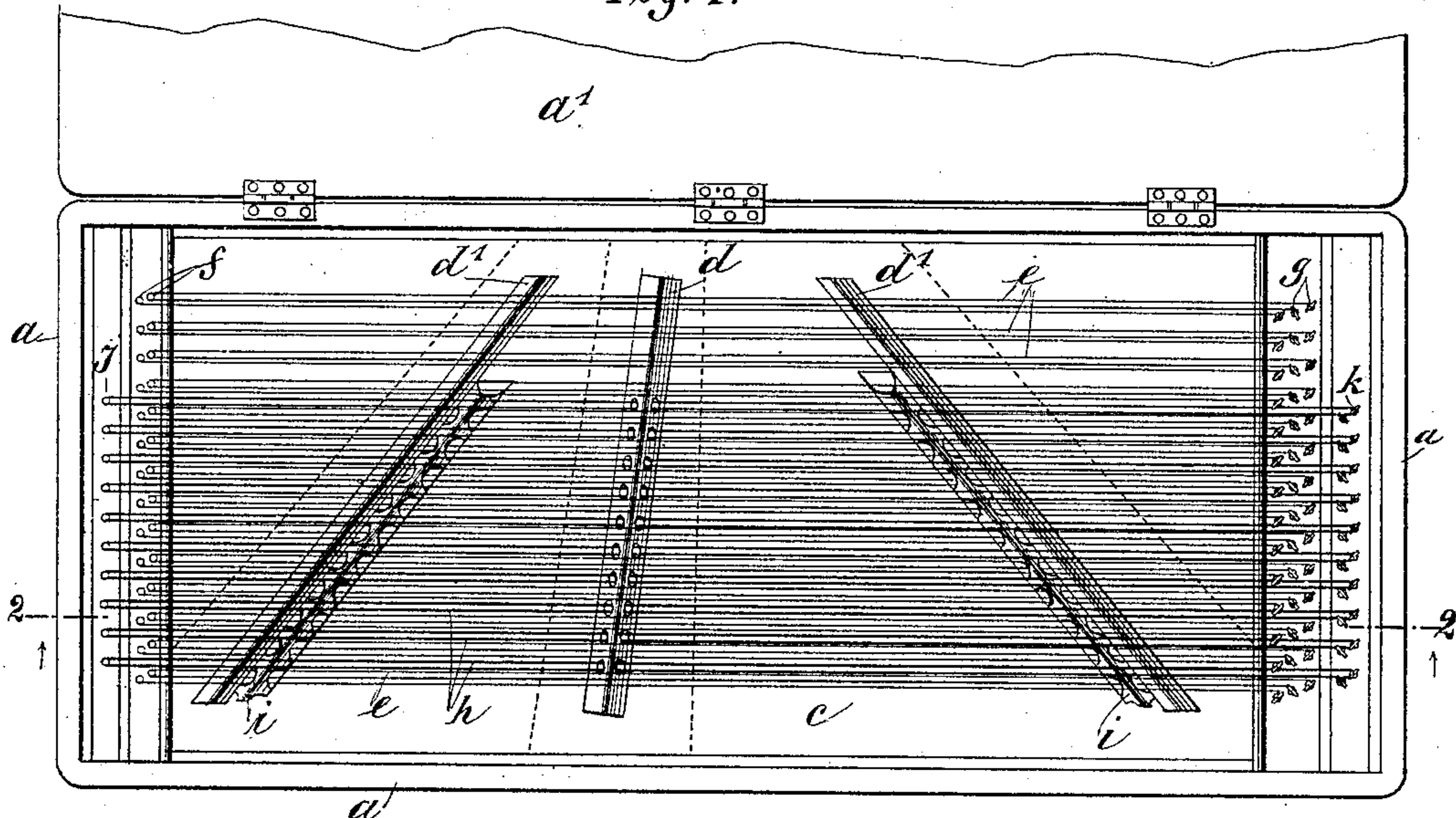


Fig: 2.

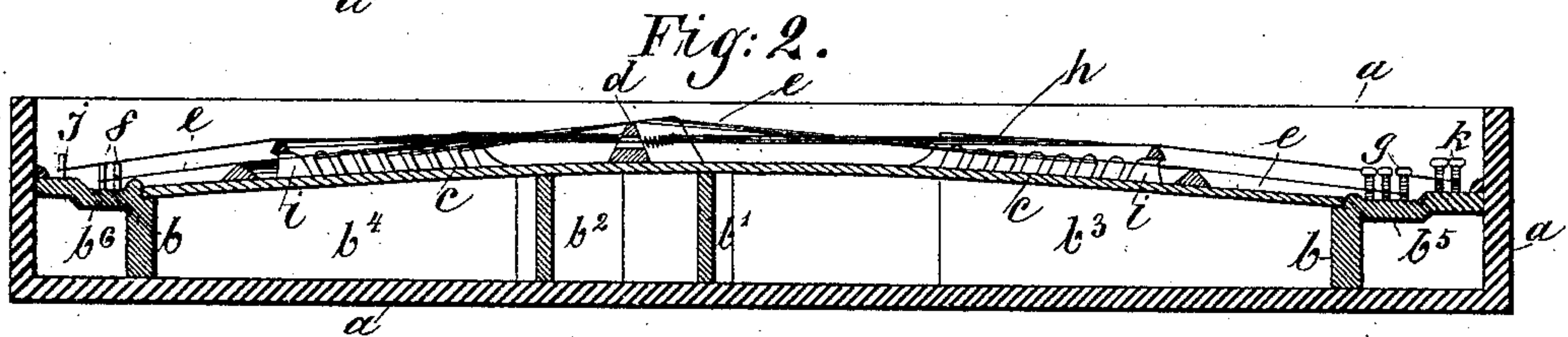
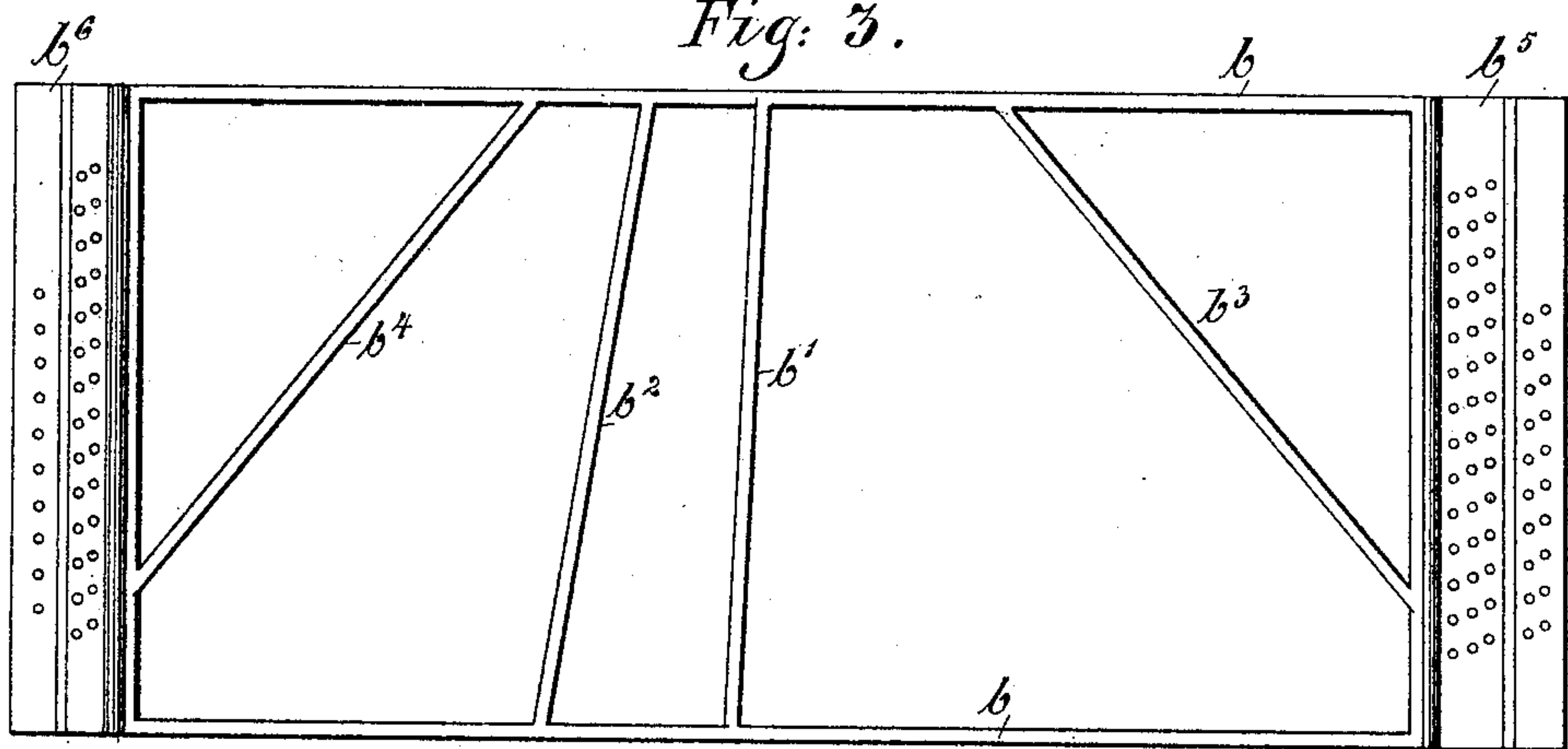


Fig: 3.



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WITNESSES:

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# UNITED STATES PATENT OFFICE.

JAMES A. MACKENZIE, OF MINNEAPOLIS, MINNESOTA.

## MUSICAL INSTRUMENT.

SPECIFICATION forming part of Letters Patent No. 440,601, dated November 11, 1890.

Application filed July 30, 1890. Serial No. 360,398. (No model.)

*To all whom it may concern:*

Be it known that I, JAMES A. MACKENZIE, a citizen of the United States, residing at Minneapolis, in the county of Hennepin and State of Minnesota, have invented certain Improvements in Musical Instruments, of which the following is a specification.

My invention relates to stringed musical instruments of the class commonly known as "dulcimers;" and the object is, in part, to improve the tone and power of the instrument and in part to provide a rigid construction which will resist the tension put upon the strings.

My invention will be hereinafter fully described, and its novel features carefully defined in the claims.

In the accompanying drawings, which serve to illustrate my invention, Figure 1 is a plan of an instrument embodying my invention. Fig. 2 is a vertical longitudinal section of the same in the plane of the line 2 2 in Fig. 1. Fig. 3 is a plan of the cast-metal frame of the instrument.

*a* is the box or casing of the instrument, and *a'* is the cover or lid hinged thereto.

*b* is the cast-iron frame of the instrument, which is arched longitudinally by preference, and *c* is the sounding-board mounted on said frame and bent to conform to its arched surface. The frame *b* has two transverse braces *b'* and *b''* and two diagonal braces *b<sup>3</sup>* and *b<sup>4</sup>*, and at its respective ends are transverse plates *b<sup>5</sup>* and *b<sup>6</sup>*, on or in which are set the pins for attaching the strings.

The lower side of the instrument, as seen in Fig. 1, is the front or the side at which the player sits. At this side are situated the lower-toned registers of the instrument, the higher-toned registers being at the back. The lower side of the iron frame, as represented in Fig. 3, is the front thereof. The diagonal braces *b<sup>3</sup>* and *b<sup>4</sup>* extend from the rear bar of the iron frame to the respective end bars thereof, and the transverse braces *b'* and *b''*, which extend obliquely across the frame, are a little wider apart at the front or lower register side of the latter than at the rear or higher register side thereof.

I will now explain the arrangement of the strings of the instrument and their bridges.

The tenor-bridge *d* rests on the sounding-board *c* at a point over the space between the transverse braces *b'* and *b''* of the frame below. The positions of these braces are indicated by dotted lines in Fig. 1. The tenor-strings *e* pass over and rest on the main tenor-bridge *d* and over the end bridges *d'*. They are preferably double, the bight of each double string being looped over a pin *f*, (seen at the left-hand end of the instrument,) and having its free ends attached to pins *g*. (Seen at the right-hand end.) These latter are tuning-pins, whereby the strings are put under proper tension. The bass-strings *h* pass through apertures in or under the main tenor-bridge *d* and over the two bass-bridges *i*. These latter bridges have arches or apertures in them through which the tenor-strings *e* pass on their way to the end bridges *d'*. The bridges *i* stand nearly parallel with the respective diagonal braces in the iron frame below, the positions of these latter being designated by the dotted lines in Fig. 1. The bridge *d* is not quite parallel with the respective braces *b'* and *b''*, the latter being wider apart at the front than at the back of the instrument. The bass-strings *h* are mounted in the same manner as the tenor-strings, or substantially so, the bight of each double string *h* being looped over a pin *j* at the end of the iron frame and attached at its free ends to tuning-pins *k* at the opposite end of the frame. The pins *f* and *j* may be cast integrally with the iron frame or may be set fixedly therein, as preferred. It will be seen that the construction described causes the two sets of strings *e* and *h* to cross each other at each side of bridge *d* in such a manner that the tenor-strings *e* are raised above the bass-strings *h* at each side of the main tenor-bridge, and the bass-strings are raised above the tenor-strings at two points just inside of the respective bass-bridges *i*. This arrangement permits the strings to be played upon at these elevated points. Where the strings pass through apertures in the bridges they are free to vibrate therein without contact with the latter. The vibrating portions of the bass-strings between the two bridges *i* may be struck with either the right or the left hand at the points near the bridges where they are accessible. The tenor-strings



may also be struck with either hand at either side of the main tenor-bridge *d*. This latter bridge is situated somewhat to the left of the center of the instrument, its position being  
 5 such that I am enabled to obtain a tone at each side of said bridge, that at the left side being just a fifth higher than that at the right side.

The respective arrangements of the braces  
 10 in the cast-metal frame and the bridges upon the sounding-board, as herein set forth, is of importance. By making the bridges diverge laterally farther from their respective braces in the frame at the front of the instrument  
 15 than at the back or higher register part I equalize the strength and fullness of the tone throughout the different registers or octaves. The greater the distance laterally from the bridge to the adjacent brace below the more  
 20 vibration of the sounding-board there will be at that point and the less vibration of the string. This produces the effect of short or staccato tones, such as are produced in the piano-forte by dampers upon the strings.  
 25 Thus I obtain at the front of the instrument an increased vibration of the sounding-board and a deeper and fuller tone in the lower register, which is desired, and at the back of the instrument a firmer and shriller tone in  
 30 the upper register.

By giving to the metal frame the arched form shown greater strength in proportion to its weight is imparted to said frame to enable it to resist the severe strain of the strings  
 35 necessary to give a round fullness to the tone.

I prefer to make the frame *b* and its braces of cast-iron; but it may be made of other metals as well. Iron is the cheaper metal and it fully answers the purpose. The box  
 40 *a* and sounding-board *c* will usually be of wood.

My instrument may be called an "improved dulcimer;" but I have given it the new name of "piano-harp." This name is more appropriate than dulcimer as defining the invention, because, first, it may be played with hammers, and when so played it yields the full, deep tones of the piano-forte, and not the thin wiry tones of the old dulcimer; secondly, having placed each group of strings (giving the different tones) one-third closer to each other than they are on the ordinary dulcimer, the player is able to reach an octave of strings with the fingers, as upon the piano  
 50 forte, so that when playing with the hammers (one in each hand) the fingers may be also brought into play in the same strain of music either alternately or without breaking the time, thus giving the results of both piano-  
 55 and harp. My improvements are, however, applicable to all stringed instruments of this class by whatever name they may be called.

The pins *j* and *k* for the bass-strings are set at a higher level than the pins *f* and *g*  
 65 for the tenor-strings. Thus all the strings in

passing over their respective bridges bear thereon just firmly enough to form the necessary "fret" to give a clear sound when vibrated, and no more. Any further tension on the bridge, or, what is more, on the sounding-board, is in this way prevented, and the pull on the strings in tuning is brought more nearly into a direct line

I have described the bridges *d* and *i* as having apertures in them for the passage of the strings. In reality, however, the strings *h* pass under the bridge *d* and the strings *e* pass under the bridges *i*.

Having thus described my invention, I claim—

1. A stringed instrument having as a support for the sounding-board a metal frame *b*, in which the pins for the strings are set, said frame being provided with two transverse braces *b'* and *b''*, extending from one side bar  
 85 of the frame to the other and being widest apart at the front or low-register side of the instrument, and two diagonal braces *b'''* and *b''''*, extending from the side bar of the frame at the back or high-register side of the instrument to the respective end bars of said  
 90 frame, substantially as and for the purposes set forth.

2. A stringed instrument having as a support for the sounding-board a longitudinally-arched metal frame *b*, in which the pins for the strings are set, said frame being provided with transverse braces *b'* and *b''* and diagonal braces *b'''* and *b''''*, substantially as and for the  
 95 purposes set forth.

3. The combination, in a stringed musical instrument, of the base-frame provided with pins for the strings, the sounding-board thereon, the main apertured tenor-bridge *d*, the minor tenor-bridges *d'*, the tenor-strings *e*, resting  
 105 on said bridges, the apertured bass-bridges *i*, and the bass-strings resting on same, the bass-strings passing under the bridge *d* and the tenor-strings passing under the bass-bridges *i*, the two sets of strings crossing at points  
 110 between the bridge *d* and the bridges *i*, as set forth.

4. In a stringed musical instrument, the combination, with the metal frame *b*, having transverse braces *b'* and *b''* and diagonal  
 115 braces *b'''* and *b''''*, arranged as described, of the sounding-board on said frame, the strings strained over said frame and board, and the bass and tenor bridges, the spaces between the bridges and the respective adjacent  
 120 braces in the frame below being wider at the front or low-register side of the instrument than at the high-register side, as set forth.

In witness whereof I have hereunto signed my name in the presence of two subscribing  
 125 witnesses.

JAMES A. MACKENZIE.

Witnesses:

ALEXANDER CAMPBELL,  
 W. W. PRICE.