

C. S. WEBER.
 STRINGING PIANOS.
 APPLICATION FILED APR. 25, 1910.

996,817.

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FIG. 1.

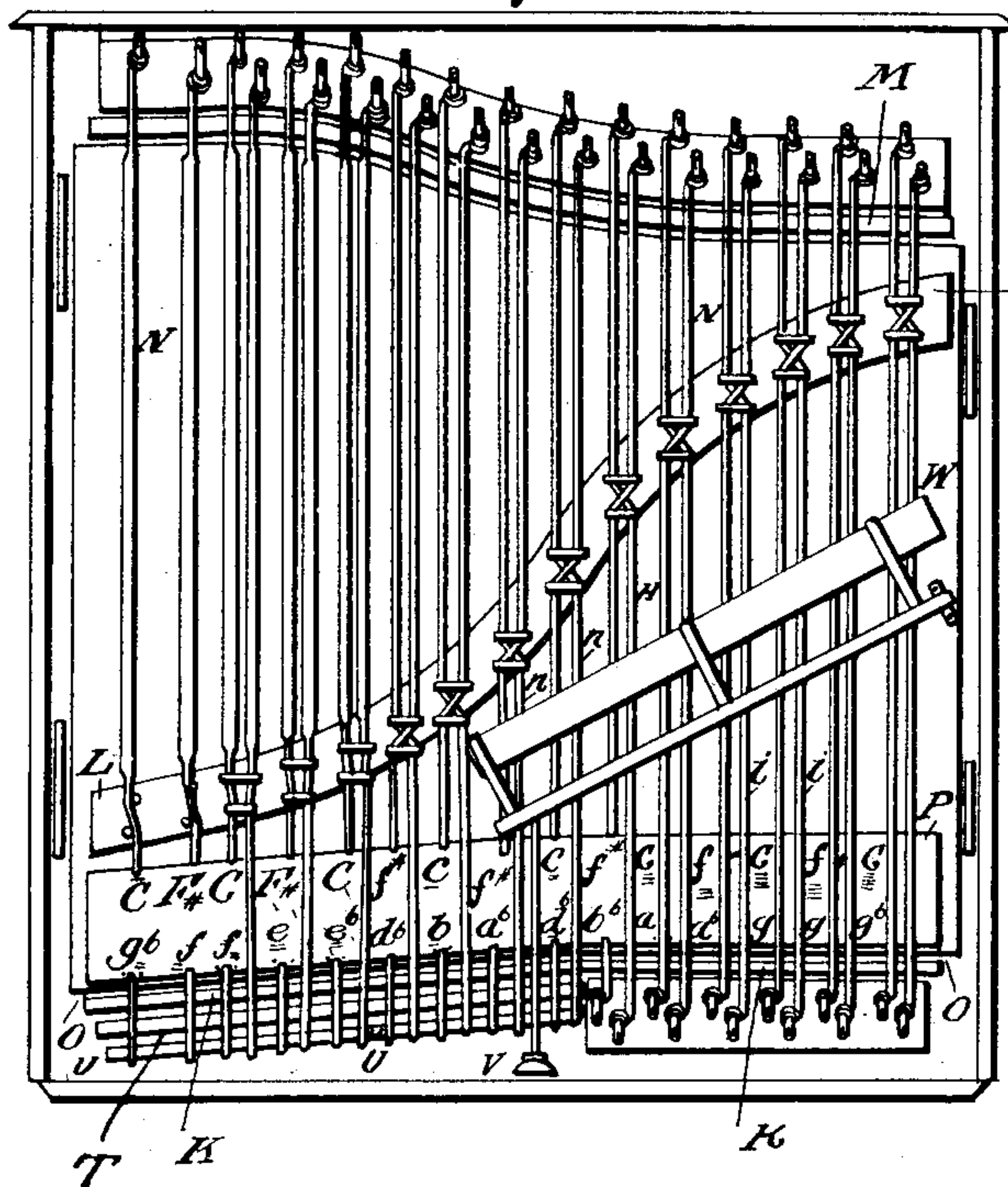


FIG. 2.

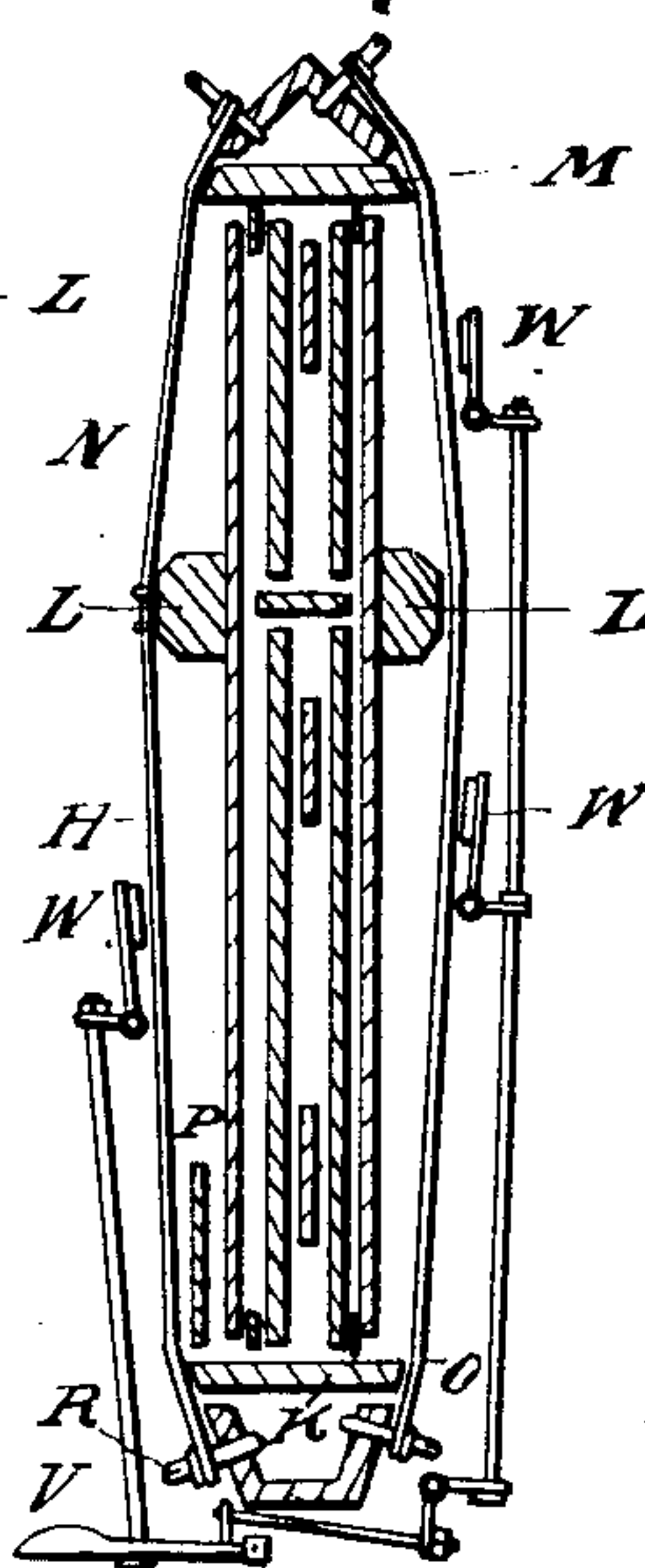
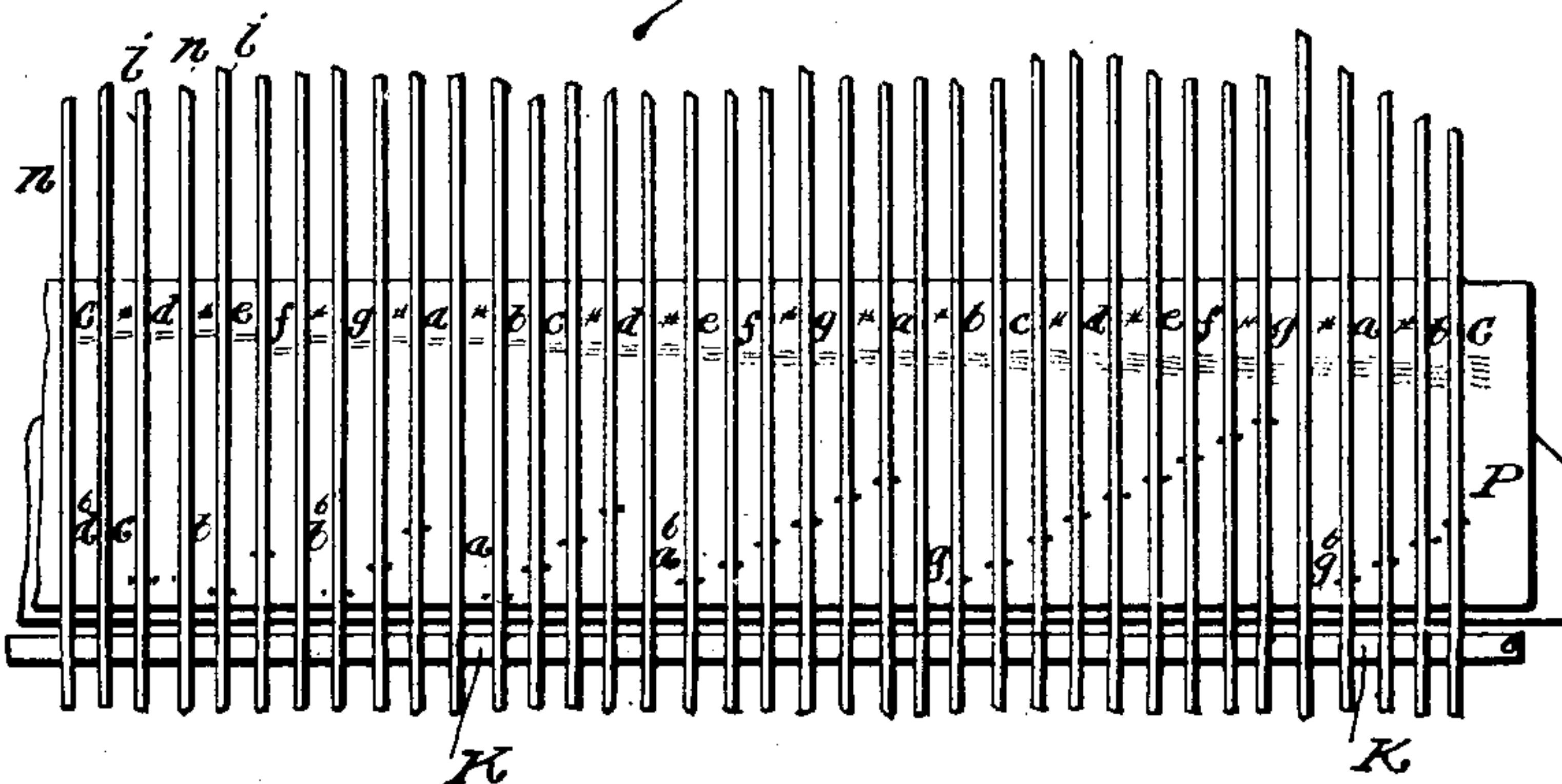


FIG. 3.



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STRINGING PIANOS.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, CHARLES S. WEBER, citizen of the United States, residing at San Jose, in the county of Santa Clara and State of California, have invented certain new and useful Improvements in Stringing Pianos, of which the following is a specification.

This invention comprehends certain new and useful improvements in stringing pianos, and relates particularly to pianos which embody extensions of the main or primary strings designed to enrich the tone of the primary strings by means of sympathetic unisons derived from the extensions.

So far as I am aware, all pianos or other stringed instruments of this type have heretofore been constructed with a certain proportion of length observed between the main string and its extension, so as to establish a direct influence between the two parts of every string. My invention in contradistinction to this is based on the discovery that very little difference is perceptible whether it be the immediate extension of a main string or that of its neighbor more or less distant that happens to be moved into sympathetic action, and with this in mind, my invention has for its object, a simple arrangement of primary strings and relatively long extensions thereof, no regard being had to any definite proportions between the main string and its extension, and no direct action being sought as between the parts mentioned, but each section being associated with or displaying contiguous thereto, signs or notations enabling the tuner to tell to what pitch to pull the extension, there being as above noted, no definite tone relation between the extension and the main string of which it forms a part.

For a full understanding of the invention, reference is to be had to the following description and accompanying drawing in which:

Figure 1 is a front view of a piano sound board embodying the improvements of my invention; Fig. 2 is a transverse sectional view; and Fig. 3 shows in a detail view how the normals and intermediaries may alternate in the highest three octaves of a piano, every note being shown, but only one unison in each.

Corresponding and like parts are referred to in the following description and accom-

panying drawings by the same reference characters.

Referring to the drawing, and now particularly to Fig. 1, M designates a top bridge plate, L the sounding-board bridge, and K a bottom bridge plate. Between the sounding-board bridge L and the top bridge plate M is the main section N, and H is the chance or sympathetic section embodying extensions of the main or primary strings in the section N, the section H extending from the sounding-board bridge L to the bottom bridge plate K. Two notes of two unisons each are shown in every octave, except the bass.

In the practical application of my invention, I tune the extensions after the free strings have been tuned, the extensions being tuned so that they will sound in unison with some note of the chromatic scale. For some few strings this point is at the bottom bridge O. These are the normals. Only their pitch as ascertained needs to be marked on the tension indicator which I have invented and which is a device enabling the tuner to establish substantially equal tension on both sides of the sound bridge, as will be hereinafter more specifically described. For all the others, a point is found somewhere within their lowest sixteenth, where if held as by a clamp or a temporary bridge, they also sound in unison with some note of the chromatic scale. These are the intermediaries. Their pitch, as well as the location of the point mentioned should be marked on the indicator. As the clamps merely have served to prepare the indicator, and as otherwise all the strings of the chance or sympathetic sections are free to vibrate in their full length, it is evident that, with a substantially equal tension on both sides of the sound bridge, the intermediaries are not in tune with any note of the chromatic scale. As shown in Fig. 3, the series of normals and intermediaries forms a novel scale descending from left to right in more and more minute steps, until the last steps are only a small fraction of a semi-tone. As the main section ascends where the other descends, its shortest strings are met by the longest strings of the chance or sympathetic section H. In thus making the extension as long as the available space will admit, and having as many different lengths as practicable, my object is to in-

crease the chances of the extensions beyond the hitch ends of the strings of forming exact multiples, especially of the short strings of the adjacent treble, it having been found
 5 that very little difference results in sympathetic effect, whether it be the direct extension or its neighbor's that forms said multiples. Even if the intermediaries were to be tuned in unison with the normals nearest to
 10 them, no serious difference would result in the total of pressure existing on opposite sides of the sound bridge. The work of the tuner would be somewhat lightened, but the chances of sympathetic response obtained
 15 from the extension would become very unevenly distributed in the scale of the piano, whereas by following the practice herein laid down, these chances increase evenly from the middle to the highest noted, the
 20 effect gained being most noticeable where the tone of the piano usually shows the greatest need of improvement. In addition, it is not only in the total of pressure, but also in every individual string, that perfect
 25 equality of tension will be attained on opposite sides of the bridge, without the objectionable feature of construction which would result from making the temporary bridges permanent. In further explanation
 30 of the term "chance section" as applied to the section H made up of extensions of the main or primary strings, I may state that there is an entire absence in my invention of any definite proportions between the lengths
 35 of the main strings and the extensions, the lengths of said extended sections being neither a multiple nor sub-multiple of the sections which are struck by the hammers, and it being left to chance whether the near-
 40 est or some distant extensions shall be moved by sympathetic action to vibrate in unison in any string that may be struck in the instrument.

If in a piano, having an extension as
 45 shown, an attempt were made to pull the strings to the pitch in the usual way, frictional resistance on the bridge would cause an unequal tension in the two sections of each string. A strain would thus be thrown
 50 on the bridge, and its support, the sound-board would give way and render the instrument useless. In the ordinary piano, the portion of the iron plate containing the hitch pins runs parallel with the bridge,
 55 only about an inch intervening. This of course allows short hitching and minimizes the strain. To utilize the hitch ends for a chance or sympathetic section having the longest possible strands and yet at the same
 60 time to avoid all strain on the bridge, I employ the tension indicator hereinbefore referred to, the same being a device enabling the tuner to establish substantially equal tension on both sides of the sound bridge.
 65 This device consists of a plate P bearing a

series of signs or letters called tension marks. These may be applied to the instrument in various ways, but the arrangement shown in detail in Fig. 3 is preferred by me as being
 70 most satisfactory. Therein the indicator is placed just above the bottom bridge plate K, in front of the sound-board and back of the strings. The portion shown in Fig. 3, extends from the twice lined to the five-
 75 times lined *c* comprising the highest three octaves. The top row of letters tells of what key any string forms the extension. The lower row of letters indicates the pitch to which a string, if it be a normal, must be
 80 tuned, while vibrating with its whole length, or the pitch to which the string, if it be an intermediary, must be tuned while vibrating with a reduced length, the reduction being secured by the clamp or temporary
 85 bridge heretofore referred to and applied to an intermediary at a predetermined point. Absence of this cut-off mark distinguishes the normals. They are brought to pitch vibrating in their normal
 90 lengths. To tune both sections of a string with the same pin, I turn such pin until the extension is brought to pitch. It will then be found that the main section is about one-half a tone or more above pitch, the difference
 95 being due to the frictional resistance incurred in the sound bridge. It only remains to duly lower the pitch of the section last-named. Both sections of a string should be tuned before attacking another. To
 100 avoid breaking, as may occur especially with the thinner sizes, I have also provided the lower ends of the treble strings with tuning pins, held in a way to be accessible for tuning tools at the bottom of the piano as indicated
 105 at R in Fig. 2. This improvement may be obviously applied to all the notes, but as the shorter and at the same time the heavier strings of the extension of the bass
 110 once fully stretched, hardly ever require tuning, the limit shown in Fig. 1 will generally prove satisfactory. Placing clamps or temporary bridges, in tuning remains, however, an objectionable feature. While the proper
 115 facilities in a factory may prevent this from causing any inconvenience, the tuner in outside practice is likely to find the work very troublesome. Although not so perfect in result as the one described, the following
 120 procedure has been proven satisfactory for all practical purposes. I tune the normal first, then subdivide the intervening semitone into as many minute tone steps as there may be intermediaries between the two normals. Pianos of different patterns need different
 125 indicators. To obtain one, I release one unison for each note from the hold of the deflectors, or of bridge pins as the case may be. Lateral deflections eliminated, the string will assume an equal tension on both
 130 sides of the bridge. I next produce a slight

outward deflection in the free string approximately as is already the case in the string frame as shown in Fig. 2. There the string does not bear against the bridge L sufficiently to cause any appreciable difference in the tension of its two sections, while the bearing results in a tone of sufficient clearness for the pitch of either section to be correctly ascertained. After the free strings are tuned, the extensions are tuned as hereinbefore described.

As shown in Fig. 2, the rear set of strings need not be secured by any deflectors or pins, where there is already an outward deflection. Economy in construction as well as in maintenance is thereby effected.

Fig. 1 shows both ends of the strings in the upper treble connected to the tuning pins held in an upper and a lower wrest cap. In the base and in the middle register, there being no need of a lower wrest cap, the strings are passed under and around the string frame to form a counterset on the rear of said frame. The block T and its protecting plate U both placed mid-way under the much wider bottom bridge-plate, allow the latter to be made considerably lighter than if the strings were placed directly under it.

W, Figs. 1 and 2 designate the dampers. There is one of these over the extensions of the main strings and two dampers on rear set as best illustrated in Fig. 2. The dampers of the main sections are not shown, as they form part of the usual piano action. The damper W of any sympathetic section in this invention really consists of a strip of damper felt fastened to a movable frame operated by pedal V which may be independent or may be connected to the loud pedal of the piano.

Having thus described the invention, what is claimed as new is:—

1. A piano, having the hitch ends of its strings extended to form sympathetic sections, the lengths of said extended sections being neither a multiple nor a sub-multiple of the sections which are struck by the hammers, and means for indicating the pitch to which the various extensions must be tuned.

2. A piano, having the hitch ends of its strings extended to form sympathetic sec-

tions, the lengths of said extended sections being neither a multiple nor a sub-multiple of the sections which are struck by the hammers, and a plate arranged in juxtaposition to the said extensions and containing tension marks indicative of the pitch to which the various extensions must be tuned.

3. A piano, having the hitch ends of its strings extended to form sympathetic sections, and an indicator arranged back of said sympathetic sections and containing two rows of characters, one row being indicative of the pitch of the main string section of which the adjacent string forms an extension and the other row indicating the pitch to which the string must be tuned while vibrating with its entire or a reduced length.

4. A piano embodying upper and lower bridge plates and an intermediate sounding board bridge, and strings tensioned over the upper and lower bridge plates and secured intermediate of their length to the sounding board bridge, whereby to form sympathetic extensions between the sounding board bridge and the lower bridge plate, and an indicator plate in front of the sound board of the piano and back of the extensions of the strings and containing marks indicative of the pitch to which the various extensions must be tuned.

5. A piano embodying a sounding board, upper and lower bridge plates, and an intermediate sounding board bridge, strings tensioned over the upper and lower bridge plates and secured intermediate of their lengths to the sounding board bridge, whereby the strings between said bridge and the upper bridge plate will form a main section and the same strings between the sounding board bridge and lower bridge plate will form a sympathetic section, means for indicating the pitch to which the strings of said sympathetic extension must be tuned to act in unison with some one or more of the strings of the main section, and dampers for the strings of the sympathetic section.

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

CHARLES S. WEBER. [L. S.]

Witnesses:

R. K. O'NEIL,
L. R. HICKS.