(No Model.)

C. S. WEBER.

STRINGING PIANOS.

No. 509,274. Patented Nov. 21, 1893.

Fig. 1.

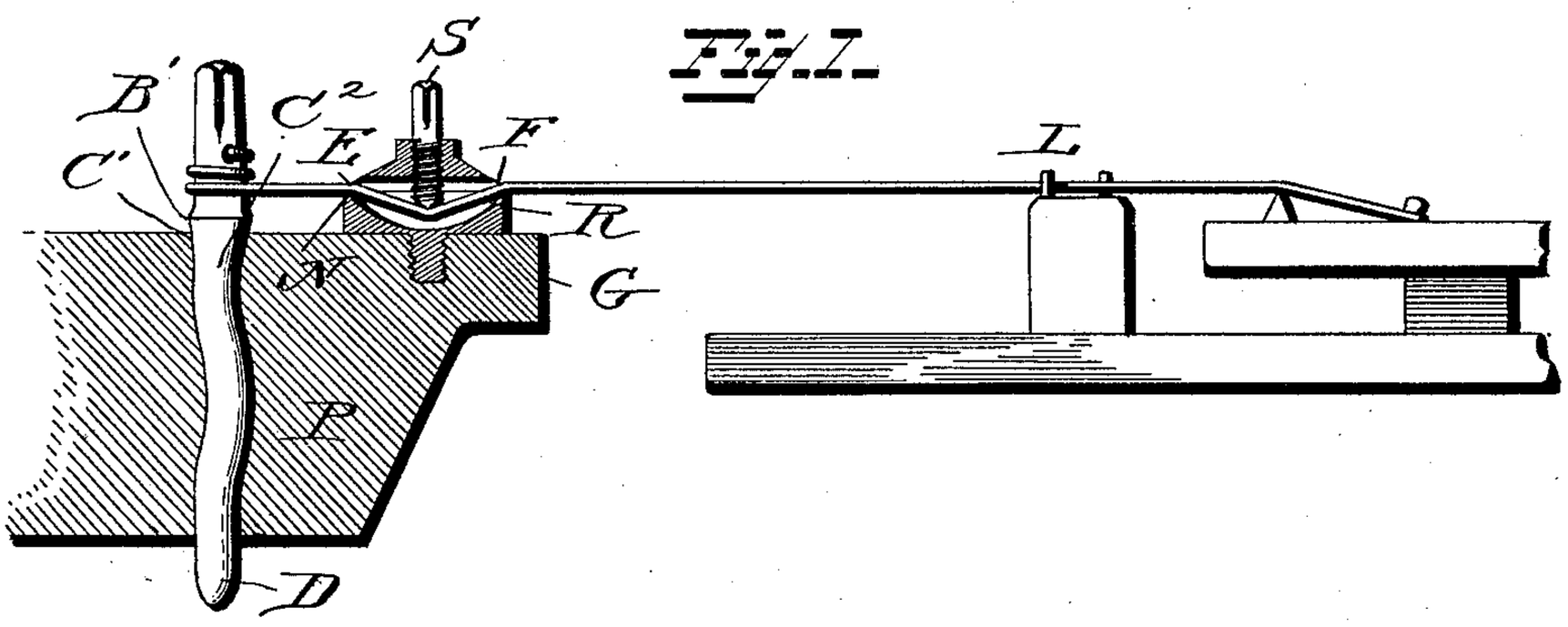
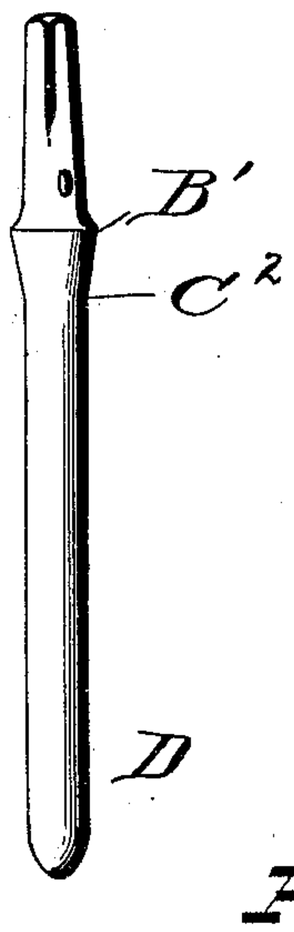


Fig. 2.



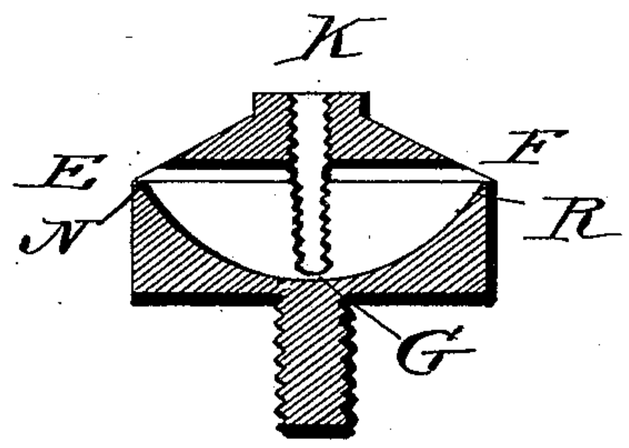
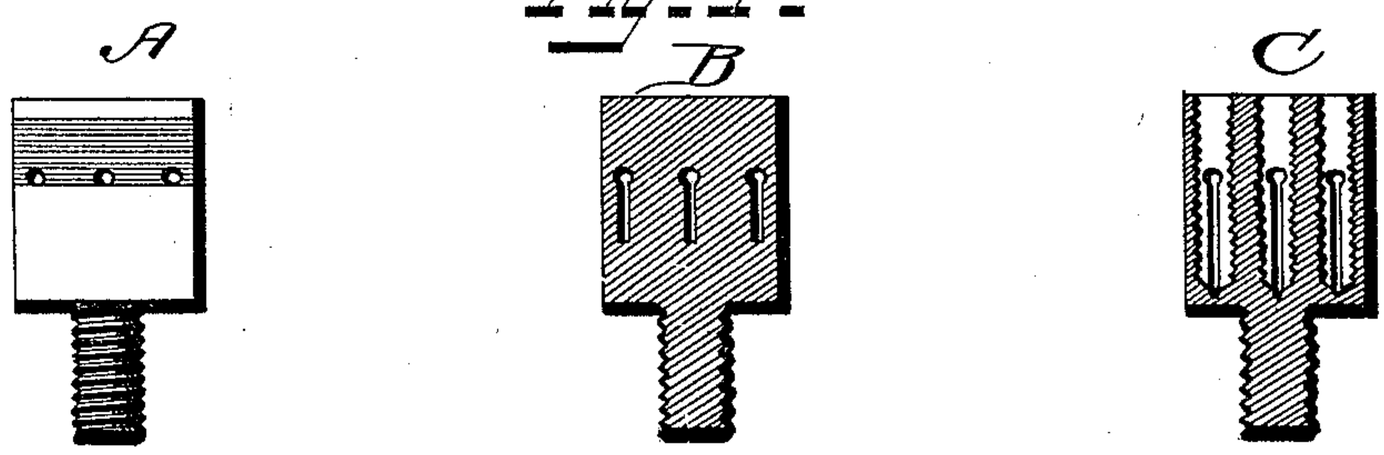


Fig. 3.

Fig. 4.



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STRINGING PIANOS.

SPECIFICATION forming part of Letters Patent No. 509,274, dated November 21, 1893.

Application filed November 18, 1892. Serial No. 452,430. (No model.)

To all whom it may concern:

Be it known that I, CHARLES S. WEBER, a citizen of the United States, residing at San José, in the county of Santa Clara and State of California, have invented certain new and useful Improvements in Stringing Pianos; and I declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to make and use the same, reference being had to the accompanying drawings, forming part of this specification.

This invention relates to stringing pianos; its especial object being an improved tuning device which consists of two essential parts: the string stretcher and the tone refiner. The first is a tuning pin held in a curved hole within a metal plate; the second is a device producing a variable deflection in a short section of the musical string.

The pin, shown in Figure 2, differs from the ordinary tuning pins in that its body is not conical but cylindrical as shown in the drawings, where C^2 D in Fig. 2 represents the body of a pin in its normal form; in Fig. 1 the same (body) being shown as forced out of its normal form by the rigid walls of the curved hole in the thickened portion of the plate P. The neck B C^2 (of the pin) is conical as shown in Figs. 1 and 2.

The hole in the metal plate has the form of an undulating line, holding the pin on exactly the same principle as a hole in which the curve represents an arc. As far as firmness of the pin is concerned no advantage is derived by substituting one form of curve for the other, but in boring the hole the difficulty is greatly reduced by adopting the form shown; especially in the case of thick plates, in which to bore a hole with a single sharp bend offers almost invincible obstacles; while an ordinary drill is sufficient to bore through the same plate with the same degree of curving when the bend in the hole instead of following all through the same direction is from time to time turned in an opposite direction before passing through the plate. By leaving the cutting edge of the drill somewhat wider than its shank, and changing the inclination of the plate as the drill proceeds, either an undulating or a spiral form can be given to the hole with almost as little trouble as for a straight one.

As a curved hole in a metal plate will show any appreciable wear only at its opening; to prevent any looseness of the pin, in this improved construction that opening is widened by means of a reamer so as to admit the tapering end of the pin's neck to the proper depth more or less as shown in Fig. 1. By pressing the pin somewhat forcibly against the plate, the original firmness of the former can be re-established at any, however distant period in the use of the instrument.

The manual effort required to turn tuning pins renders even ever so delicate graduation in the tension of a string very difficult. For that reason I only use the pins to roughly tune the instrument. The exact tension I impart to the strings by means of the tone refiner. This in its usual construction has the shape of an ordinary agraffe. It is placed so as to form one end of the section to be tuned, and to support said end at an invariable distance from the metal plate of the instrument to which the device is rigidly secured. F L in Fig. 1. shows the section tuned by the variable deflection in the originally straight portion of string E F, said deflection being produced by moving the point G of the deflecting screw S.

A hole, giving convenient passage to the string, is bored from one end of the agraffe to the other, preferably at the lower end of the sloping surface, as shown in Fig. 3 between the points E and F. Within the agraffe beginning about one-sixteenth inch from its ends and gradually increasing in depth toward its middle a triangular or a semicircular cavity is formed, having its apex turned toward the metal plate, while its base is coincident with and merges into the hole which gives a direct passage to the string, as shown in Fig. 3; the straight line N, R forming the base, and the point G the apex of said cavity.

A vertical hole, threaded throughout its length, extends from the top of the agraffe. This hole is wider than the horizontal one which it traverses before it enters the cavity at whose apex it stops. Figs. 1 and 3 show K G the vertical hole intersecting the horizontal one as well as the cavity. In Fig. 4 C in

turn shows the first bisected in its lower portion by the last two. The relative position of said holes and the cavity is plainly shown in Fig. 4, where *a*, gives an end view of agraffe; B gives an end view of vertical section halfway between end and middle; C gives a transversal section at the middle of agraffe. In *a* three holes are visible, each destined to give passage for one unison of a three stringed note. In B under the holes and merged into the same the cavities are already apparent, without however having attained yet their full depth which is shown in C in the background of the threaded holes.

As indicated in Fig. 3 by the reduced width of the threading below the horizontal hole, part of that threading is cut away in forming the semicircular cavity; still enough remains to hold the end of the deflecting screw firmly inclosed between rigid surfaces, no matter how far a string may be deflected by the progress of said point.

It is well known that a single deflecting point as formed by the apex of a metal bridge does not prevent the vibrations in a section of steel string from exciting the adjoining section and causing it to vibrate more or less. The induced vibrations in their turn will react, and according to their nature will modify the quality of tone obtained from the section originally sounded. Now whenever one end of a section is not firmly enough supported, its vibrations will have a more or less irregular period, resulting in a more or less unmusical sound, which in its reaction is equally unmusical. No difficulty is experienced in the ordinary construction to obviate this danger by supporting the ends of each section on metal points immovably secured to some rigid frame. But it is different where, as in the present construction one end must be movable.

Although it is admitted that the point of the deflecting screw secured as shown does not form as rigid a support as an immovable bridge does, still it is claimed that the said point is far better secured against sidewise deflection than where a similar screw or its substitute must project some distance unsupported, in order to properly deflect a corresponding section of string. But it is not only the vibrations with an irregular period that may react disagreeably on the tone of the section originally sounded; many times a discordant interval results from some distant overtone formed in the short end piece adjoining the main section. There are only two ways to prevent this:—first, by regulating the proportional length of these sections so that only a harmonious interval should result from their vibrations; second, by rendering the short (end) section rigid.

The requirement of variable length in the short section prevents any definite proportion being established between the sections specified in this invention. Therefore the second method is resorted to. As the act of deflection forces the string from a hole giving convenient passage, into a cavity with close fitting sides, the deflected portion of the string throughout its length is kept in close contact with rigid surfaces, and its susceptibility to vibration is thereby brought down to the lowest practicable limit, without the use of cloth, ribbon or other damper which is known to react unfavorably on the clearness of tone in the adjoining section. The tone refiner agraffe has been shown here as deflecting the strings of a single note only. But it is evident that by increasing the width of the device as well as the number of holes and cavities, the strings belonging to a number of notes may be deflected within a single casting.

The agraffe may be fastened in any other manner besides the one indicated in the drawings, which will only answer where there is sufficient room for turning the device around its center.

I am aware that tuning one section of string by causing a deflection in the adjoining one is a method already explained in several inventions, in which devices in some respect similar to the present have been shown and claimed. I therefore will not claim anything what either has been directly shown or what may be reasonably implied in those inventions. In the same way I admit that the double curve shown as the proper form of the curved pin hole in a metal plate is only a special form of curve, and cannot therefore claim a merit of novelty, no more than a conical (or a funnel shaped) hole. But their combination, being novel as well as useful, will be set forth as a claim.

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

1. In a piano, a metal plate having a curved cylindrical pin hole with a conical opening to said hole, substantially as described.

2. In a piano the combination with a metal plate having a curved pin hole, of a tuning pin having a cylindrical body and a conical or tapering neck substantially as described.

3. In a piano a tuning device having a threaded hole intersecting a semicircular or triangular cavity substantially as described.

4. In a piano a tuning device having a triangular or semicircular cavity of less width than the hole giving passage to the string deflected into said cavity, substantially as described.

5. In a piano a tuning device having a threaded hole intersected by a triangular or a semicircular cavity of less width than the said threaded hole, substantially as described.

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

CHARLES S. WEBER.

Witnesses:
H. S. FOOTE,
O. J. BROADDUS.