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PIANO-FORTE.

No. 178,717.

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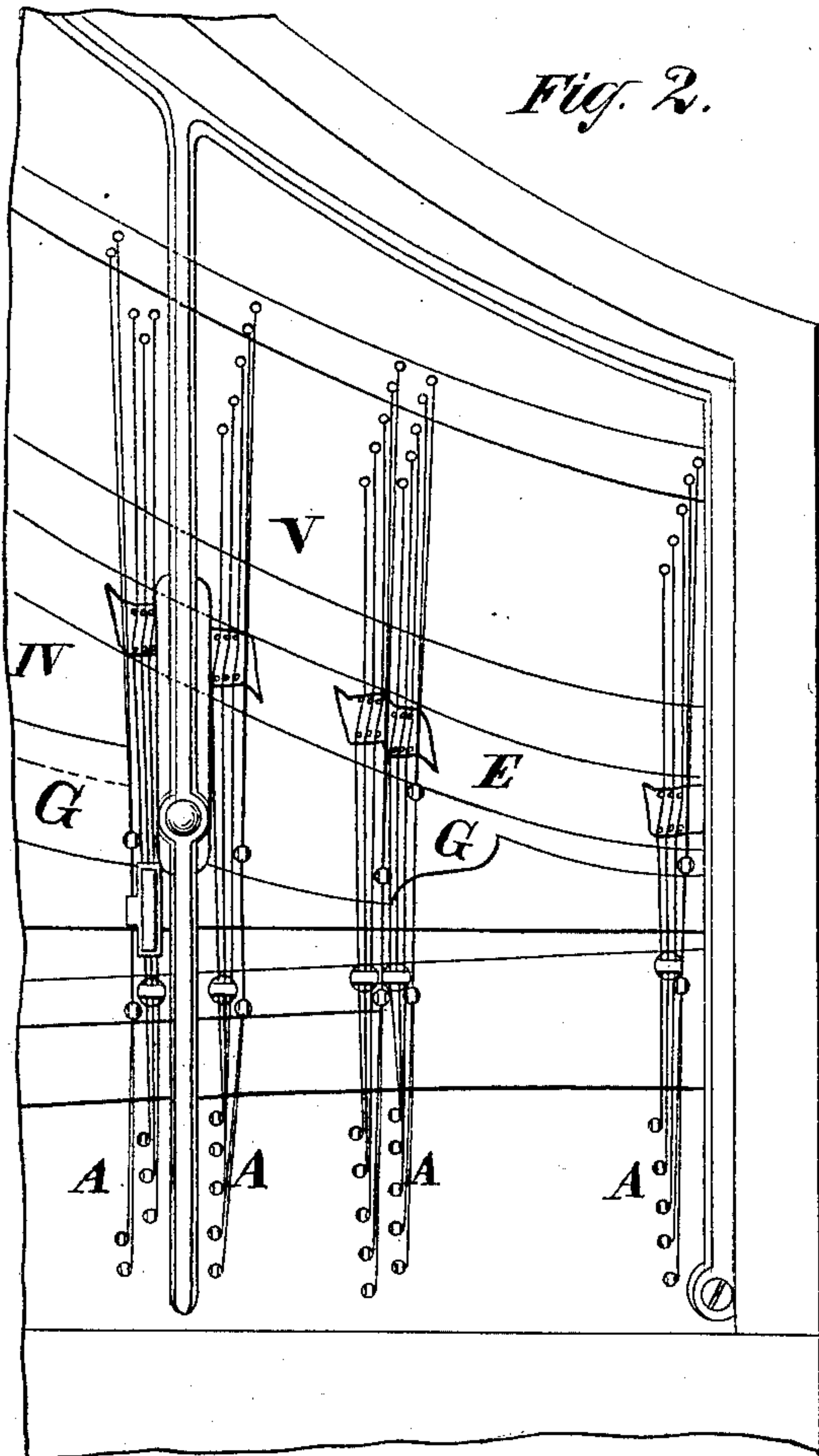
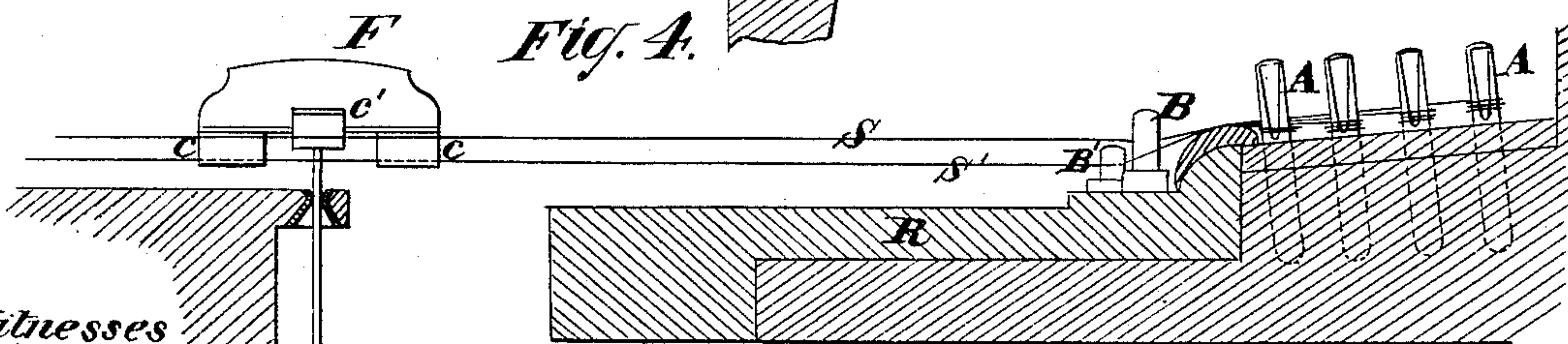
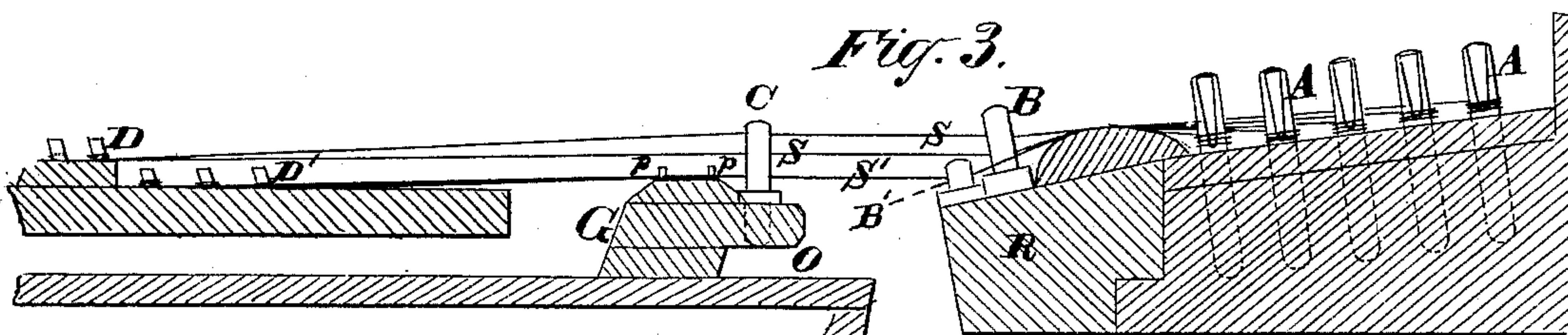
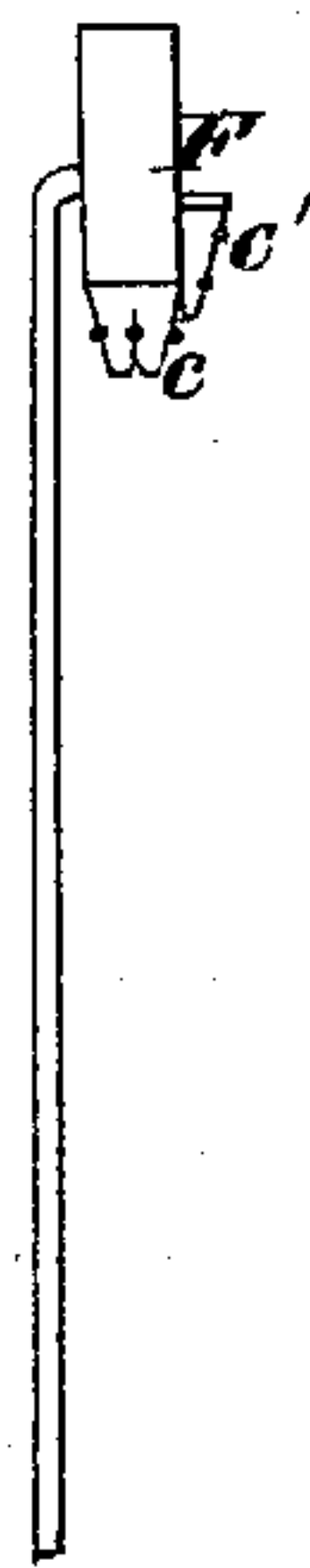


Fig. 5.



Witnesses
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UNITED STATES PATENT OFFICE.

JULIUS BLÜTHNER, OF LEIPSIC, SAXONY.

IMPROVEMENT IN PIANO-FORTES.

Specification forming part of Letters Patent No. **178,717**, dated June 13, 1876; application filed April 15, 1876.

To all whom it may concern:

Be it known that I, JULIUS BLÜTHNER, of Leipsic, in the Kingdom of Saxony, have invented Improvements in Piano-Fortes; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawing, which forms part of this specification.

My invention relates to an improved method of stringing piano-fortes, to improved construction and arrangement of the parts which support the strings, and to improved dampers for damping the strings, by which improvements the volume of tone in piano-fortes is increased, refined, and improved.

It is well known that every sound caused by the vibration of a piano-string consists of the principal tone mingled with the overtones or harmonics, and that the more the principal tone, in combination with the harmonious overtones, is heard, and the less the discordant overtones (as the seventh [7th] and ninth [9th] partial tones) are allowed to become prominent, the greater is the force of the sound, and the finer and more excellent is its quality. Therefore, the increase of the harmonious overtones, especially the first harmonious overtone—to wit, the octave—has been attempted by measuring; but the realization of this attempt has been impossible, because the octaves obtained by the halves of the strings so measured could not be damped. An essential improvement could only be obtained by adopting an aliquot system, which renders possible the damping of the single overtones simultaneously with the principal tones.

My improvement, which accomplishes the object set forth, comprises a construction and arrangement providing for the stringing of separate strings for overtones, and in carrying out my improvement in practice, in order to surmount the difficulties attending the use of overtone-strings, I have found it necessary to change very materially the construction of the instrument.

The difficulties met are as follows: First, the distance has to be calculated in which the strings for the first overtones are to be strung over the side sets or the side choirs. This necessitated many experiments with the mono-

chord to find in what distance the string tuned for an octave higher than the three strings of the side sets or side choirs could vibrate in common with the principal tone, and in such manner that the combination of the principal tone and the octave would appear as one single tone, and that the effect would be a fine decrescendo. This being accomplished, the construction is altered to admit the new arrangement of strings.

First, the back claviary has been enlarged; second, the tuning-block has been given a new form, which allows the same to support the screws for side sets or side choirs of from four (4) to six (6) strings, instead of those of only three (3) strings; third, the agraffes or clasps are arranged in a wholly new manner for obtaining the proper proportions of vibrations; fourth, for the lower bass-strings a new bridge is provided, and constructed in such manner as to keep the said bass-strings insulated from the side sets or side choirs provided with overtone-strings, which side sets or side choirs reach the commencements of the lower bass-strings; fifth, the cross arrangement of the overstrung bass-strings and the strings of the middle-tone region is dispensed with; sixth, a new construction of damper has been provided, whereby the overtone-strings may be damped simultaneously with the damping of the strings of the principal tones.

Figure 1 in the accompanying drawing represents a top view of a grand piano-forte with my improvements attached, and with the cover removed. Fig. 2 is an enlarged detail view of the high treble-tone region of such a piano. Figs. 3 and 4 are, respectively, diagrams which will be referred to in explanation of my improvements. Fig. 5 is a detailed view of my improved damper.

The piano-forte, viewed from above, as in Fig. 1, may be considered, for purposes of explanation, as divided into five longitudinal planes or divisions, numbered, respectively, I, II, III, IV, V. In the divisions III, IV, V, are arranged at A, in the tuning-block, four or five screws for every tone, of which three are for the principal tone, and the one or two others are for the overtone.

The strings S', for the principal tone, pass, as usual, through the agraffes or clasps B' of

the double agraffe or clasps-range R, thence through the bridge-pegs *p*, on the bridge G, and thence to their attaching-pegs D', as shown in Figs. 3 and 4. For the overtones, downward through the treble, two overtone or harmonic strings, S, are strung for each principal tone, which, in their agraffes or clasps B, are placed one above the other, as shown in Fig. 3.

From the agraffe C on the bridge G the upper of the said two overtone or harmonic strings inclines downward, and is attached to a pin, D, at the side of, and on a level with, the attaching-pin, to which the lower of the said two overtone or harmonic strings is attached. The said overtone or harmonic strings S are tuned an octave higher than their principal tones, and have, except at the higher treble-strings, only half the vibrating measure of the strings of the principal tones. In the extreme high treble of division V the overtone or harmonic strings have the same vibrating measure as the strings of the principal tones, but the overtone or harmonic strings are thinner than the principal tone-strings, and are tuned an octave higher than their principal tone-strings. The bridge G, on which the agraffes C of the overtone or harmonic strings are placed, is, from or near the middle, (represented by a dotted line in Fig. 1,) glued on the sound-board, the front part, into which said agraffes are screwed, overhanging the sound-board, as shown in Fig. 3 at O, to permit free vibration of the said sound-board. In division V the said bridge G meets, and is united with, the bridge E on the sound-board, and above the junction of these bridges the overtone or harmonic strings are given the same vibrating length as the strings of their respective principal tones. By these peculiarities of construction the increase and prolongation of the tone is equally obtained, and the shrill and jangling sound is avoided.

A special sound-board bridge is provided for the overstrung strings, and the latter are placed so as not to cross other strings. A

special sound-board bridge is also provided for the support of the strings in the division II. The bridge E, Fig. 1, supporting the strings of the other tones, goes through the divisions II, III, IV, and V, and also reaches division I. F, Figs. 4 and 5, is the damper, which has double damping-cones *c c'* in divisions III, IV, and V, for damping simultaneously the strings S' of the principal tone, and the strings S of the overtones. In this system the strings placed over the strings of the principal tones can also be tuned an octave lower; or three strings in triple accord may be used; or the strings may be arranged and tuned according to the succession of overtones—octave, twelfth, &c. For the tuning process the arrangement and proportions of vibrating lengths of strings shown in the drawing, and herein described, are best adapted, as the strings may easily be put on, removed, or taken out, without any trouble to the tuner. This aliquot system is applicable to all constructions of piano-fortes.

In the drawings the damping is shown as effected from above, but it can also be done from below.

I claim—

1. The combination and arrangement of the main or principal strings S', and the overtone or harmonic strings S, substantially as and for the purpose herein described.

2. The damper F, constructed and applied to operate on the principal strings, and the corresponding overtone-strings, substantially as described, and for the purpose set forth.

3. The bridge G, constructed as described, and its agraffes C for the overtone-strings arranged on the sound-board, substantially as and for the purpose set forth.

In testimony that I claim the foregoing I have hereunto set my hand this 7th day of February, 1876.

JULIUS BLÜTHNER.

Witnesses:

JOHN H. STEUART,
HENRY VANARSDALE.