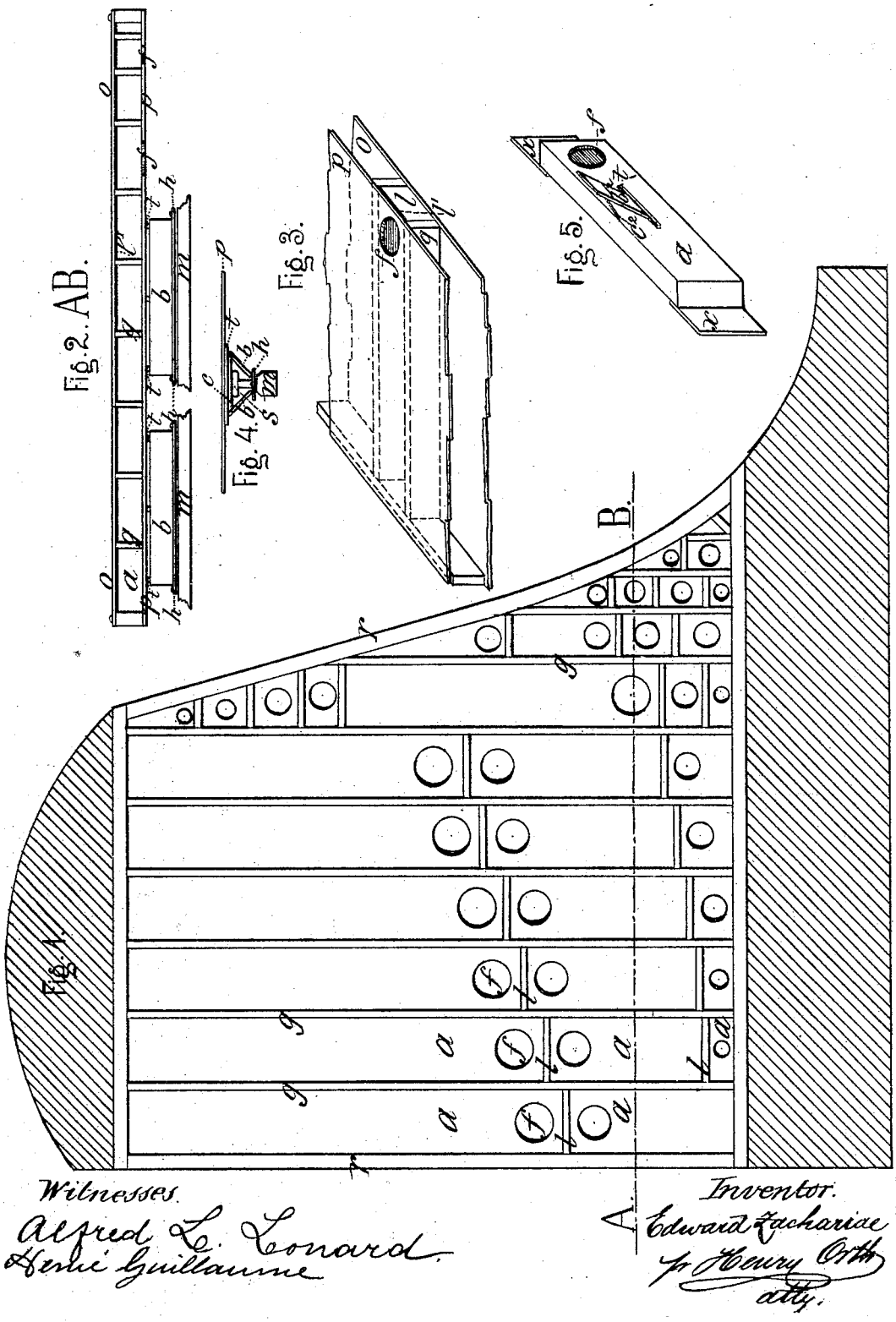
3 Sheets—Sheet 1.

E. ZACHARIAE.

PIANO-FORTE ATTACHMENT.

No. 186,397. Patented Jan. 16, 1877.



Witnesses.
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Henri Guillaume

Inventor.
Edward Zachariae
per Henry Orth
atty.

3 Sheets—Sheet 2.

E. ZACHARIAE.

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Fig. 6.

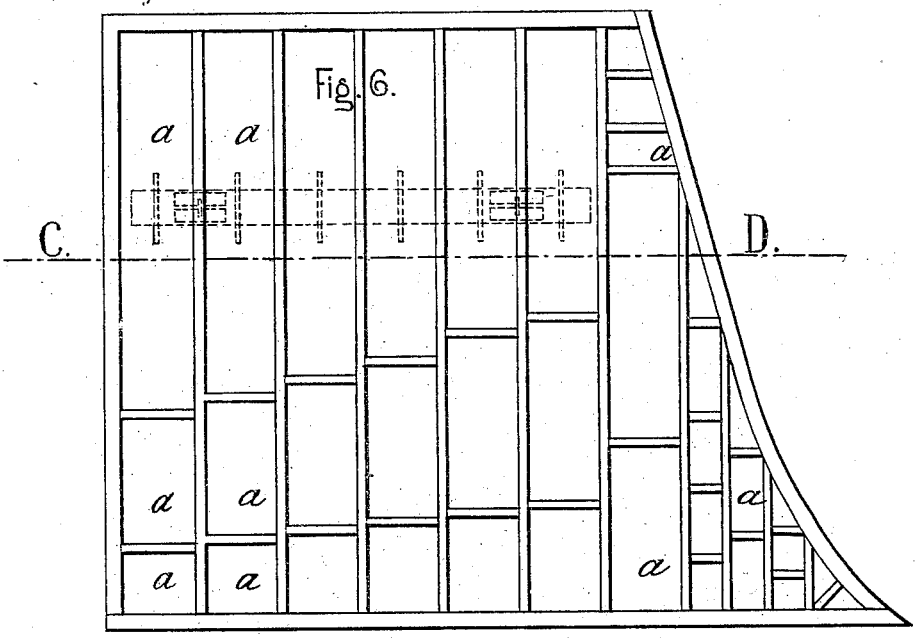


Fig. 7. CD.

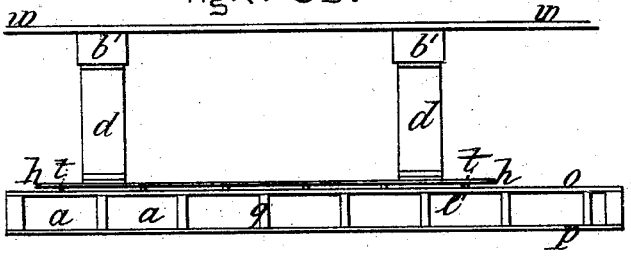


Fig. 8.

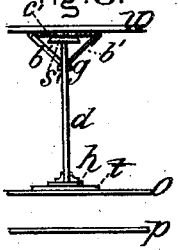


Fig. 9.

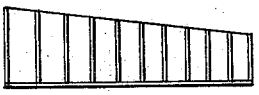
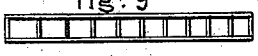


Fig. 9x.



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3 Sheets—Sheet 3.

E. ZACHARIAE.

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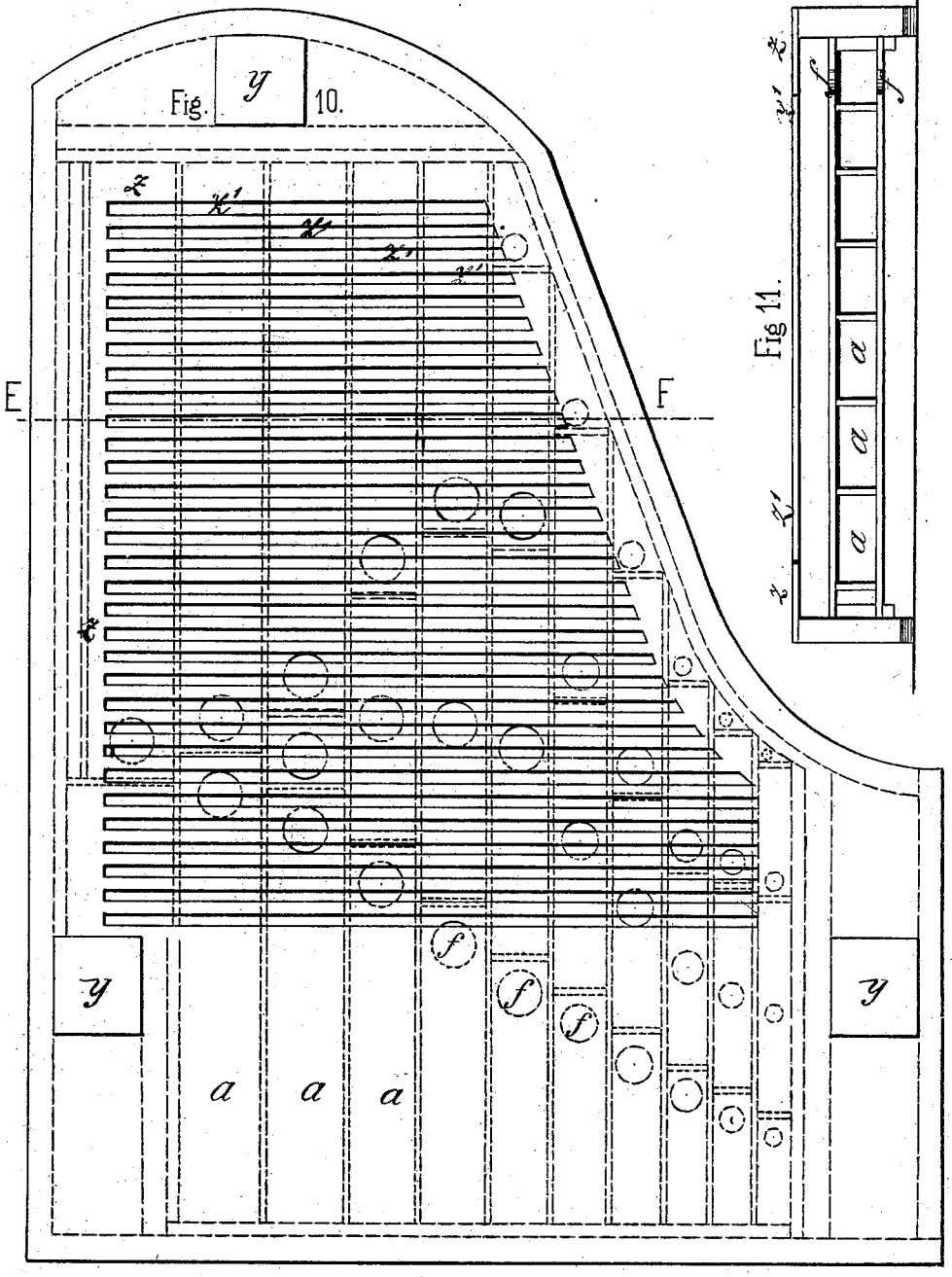

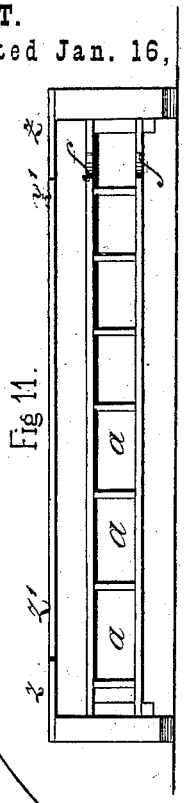

Witnesses
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Edward Zachariae
per Henry Orth
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UNITED STATES PATENT OFFICE.

EDWARD ZACHARIAE, OF VIENNA, AUSTRIA.

IMPROVEMENT IN PIANO-FORTE ATTACHMENTS.

Specification forming part of Letters Patent No. **186,397**, dated January 16, 1877; application filed September 25, 1876.

To all whom it may concern:

Be it known that I, EDWARD ZACHARIAE, of Vienna, Empire of Austria, have invented a certain Improvement in Sound-Boards, of which the following is a specification, reference being had to the accompanying drawings.

This invention relates to an improvement in sound-boards for piano-fortes and similar instruments, and consists in arranging peculiar sounding-cells or cellular boxes within the instrument, and in devices for bringing these sounding-boxes into contact with the ordinary sounding-board, in order to induce their resonant action, and also in the use of similar cellular sounding-boxes as stages or platforms for pianos.

The accompanying drawings fully illustrate this invention, and show its application to a grand piano; but it will be evident that this invention is applicable to all other forms of piano-fortes.

Figure 1 is a plan view with the top board removed, and Fig. 2 a section on the line A B, of a cellular sounding-box, constructed according to this invention, and to be arranged above the strings of the piano. Fig. 3 shows the arrangement of a single cell in such a sounding-box. Fig. 4 shows the arrangement for inducing the action of the cellular sounding-box by connecting it with the ordinary sounding-board. Fig. 5 shows a single cell with the arrangement for inducing its action by conveying to it the vibrations of the ordinary sound-board. Fig. 6 is a plan view with the top board removed, and Fig. 7 a section on the line C D, of a cellular sounding-box to be arranged below the strings. Fig. 8 is a view of the arrangement for conveying to this cellular sounding-box the vibrations of the ordinary sound-board. Fig. 9 shows a special arrangement of sounding-cells for the higher and highest notes. Fig. 10 is a plan view, and Fig. 11 a section on the line E F, of a cellular sounding-box to be used as a platform or stage for a piano-forte.

The same letters denote everywhere similar parts.

a a are the sounding cells or boxes, provided with apertures *f f*. The sounding-boxes or cells, arranged within the piano, communicate, or are brought into contact, with the ordinary sound-board by means of arrangements which I call the "induction-bars," and which serve to convey to these sounding-boxes the vibrations proceeding from the sound-board, and thereby cause the air inclosed in the cells to give resonant tones.

It is evident that, by suitably varying the dimensions of these cells or boxes, as shown, different tones may be produced at will.

Figs. 1, 2, 3, and 4 show the construction of the parts of an entire cellular box according to this invention, and to be arranged above the strings. The cells *a* in this box are formed by longitudinal partitions *g* and cross-partitions *l*, arranged between the top board *o* and bottom board *p*. The cross-partitions *l* are preferably somewhat lower than the others, so as to leave an open slit, *l'*. The entire box is fastened to the sides of the piano at *r*. The apertures *f* are in the bottom board *p*, opposite the ordinary sounding-board *w*, Fig. 7. The contact between this box and the ordinary sound-board *w* is effected by means of the arrangement which I call the induction-bars, and consisting of the parts *t*, *b*, and *h*, Fig. 2, connected with the ordinary sound-board bridge *m*. As shown in Figs. 2 and 4, the strips *t*, glued to the bottom board *p* of the box at the central lines of the cells, rest on the wings *b b*, which are hinged to the bar *d*, and held together by the spiral springs *c*. The stop S prevents the wings *b b* from being drawn too closely together. By this construction the contact between the sounding-box and the induction-bars is made perfect, and, while the wings *b b* yield to the pressure of the sounding-box when the apparatus is being fitted together, the construction is not so elastic as to absorb the vibrations evolved from the ordinary sounding-board *w*, but conveys them to the sounding-box, and thus induces the resonant action of its cells *d*. The cells are made of different length, so as to produce different determined tones.

Fig. 5 shows the construction of a single cell. These single cells are to be fixed in the small free spaces at the sides of the frame of the piano, and between the cross-beams beneath the sounding-board, thus utilizing all

the free space into which an entire sounding-box could not be arranged. They communicate with the ordinary sounding-board by means of the flaps b^2, provided with spiral springs c^2, and hinged by a piece of parchment to the strips t. They are fastened to the beams of the piano by the lugs x. Besides the aperture f to the closed space a, I also, preferably, arrange a small aperture at the narrow end (not visible in the drawing) of this cell, and I sometimes make, instead of this small aperture, a large one opposite to the aperture f, and of the same size. I can also make these single cells double by arranging in them longitudinal partitions, running parallel to the top and bottom.

Figs. 9 and $9^{\times}$ show a section and view of an arrangement of a multiple-cell for resounding the higher and highest notes, and to be arranged at some suitable point in the place of a single cell. It consists of a number of cells of diminishing size, arranged together like the reeds of a pan-flute.

Figs. 6, 7, and 8 illustrate the construction of the sounding-box arranged below the ordinary sounding-board, and below the beams of the frame of the piano. The construction is essentially the same as that of the upper sounding-box, only in this case the apertures f are formed not in the bottom board, but in the top board o, so as to be opposite the ordinary sounding-board w. The induction-bars, (the position of which is indicated in Fig. 6 by dotted lines,) are also somewhat different in their arrangement. The wings b^1 b^1, provided with the spiral springs c^1, are each hinged, by pieces of parchment at g, to the post d, fixed to the ledge h, which rests on the strips t. In this construction the wings b^1 b^1 touch the sounding-board w and convey its vibrations to the sounding-box through the parts d, h, and t, as shown.

Figs. 10 and 11 illustrate a sounding-box constructed according to my invention, and to be placed as a platform or stage beneath a piano, the legs of the piano resting thereon at y y y. The construction of this sounding-platform is essentially the same as of the sounding-boxes described, except that the use of the induction bars is dispensed with, and that the apertures f are formed both in the top and bottom boards. The sounding-platform is protected by a board, Z, covering it, but provided at z' z' with slits to allow the vibrations of air proceeding from the sound-board of the piano to react directly on this sounding-platform. As shown in the drawing, this sounding-platform is held merely at its sides, so that its vibrations are hindered as little as possible.

For the purpose of modulating the resonant action of the lower sounding-box shown in Fig. 6, and of the sounding-platform shown in Fig. 10, I can arrange flaps in front of and behind the lower sounding-box shown in Fig. 6, and connect these flaps with pedals, thus enabling me to more or less close or open the spaces in front of and behind the sounding-box, and thus cause the vibrations communicated to the sounding-stage to be more or less regulated.

I claim—

1. A sound-board for piano-fortes, consisting of a series of sounding cells or boxes, arranged substantially as described, for the purpose specified.

2. The arrangement of two or more sounding-boxes in a piano-forte, when these sound ing-boxes are constructed so that each will give a determined resonant tone.

3. A sound-board for piano-fortes, consisting of a series of resonant cells, having each a determined tone, connected to the ordinary sound-board by means of movable induction-bars, in the manner and for the purposes specified.

4. In piano-fortes, a cellular sounding-box, arranged to be connected with and disconnected from the ordinary sounding-board by means of movable induction-wings, essentially as described.

5. The combination of the lower cellular sounding-box with the modulating-flaps, essentially as described.

6. The combination of sounding-cells or boxes a with movable induction-wings b, b^1, or b^2, essentially as described, and for the purpose described.

7. In piano-fortes, the combination of wings b, or b^1, or b^2, with springs c, c^1, or c^2.

8. The combination of wings b, prop d, bar s, and spring c, essentially as described.

9. The combination of the ledge h, bar t, post d, wings b^1, stop S′, and spring c^1, essentially as described.

10. The combination of the wing or flap b^2 with the spring c^2.

In witness that I claim the foregoing I have hereunto set my hand this 22d day of August, 1876.

EDWARD ZACHARIAE.

Witnesses:

C. O. PAGET,

HENRY ORTH.