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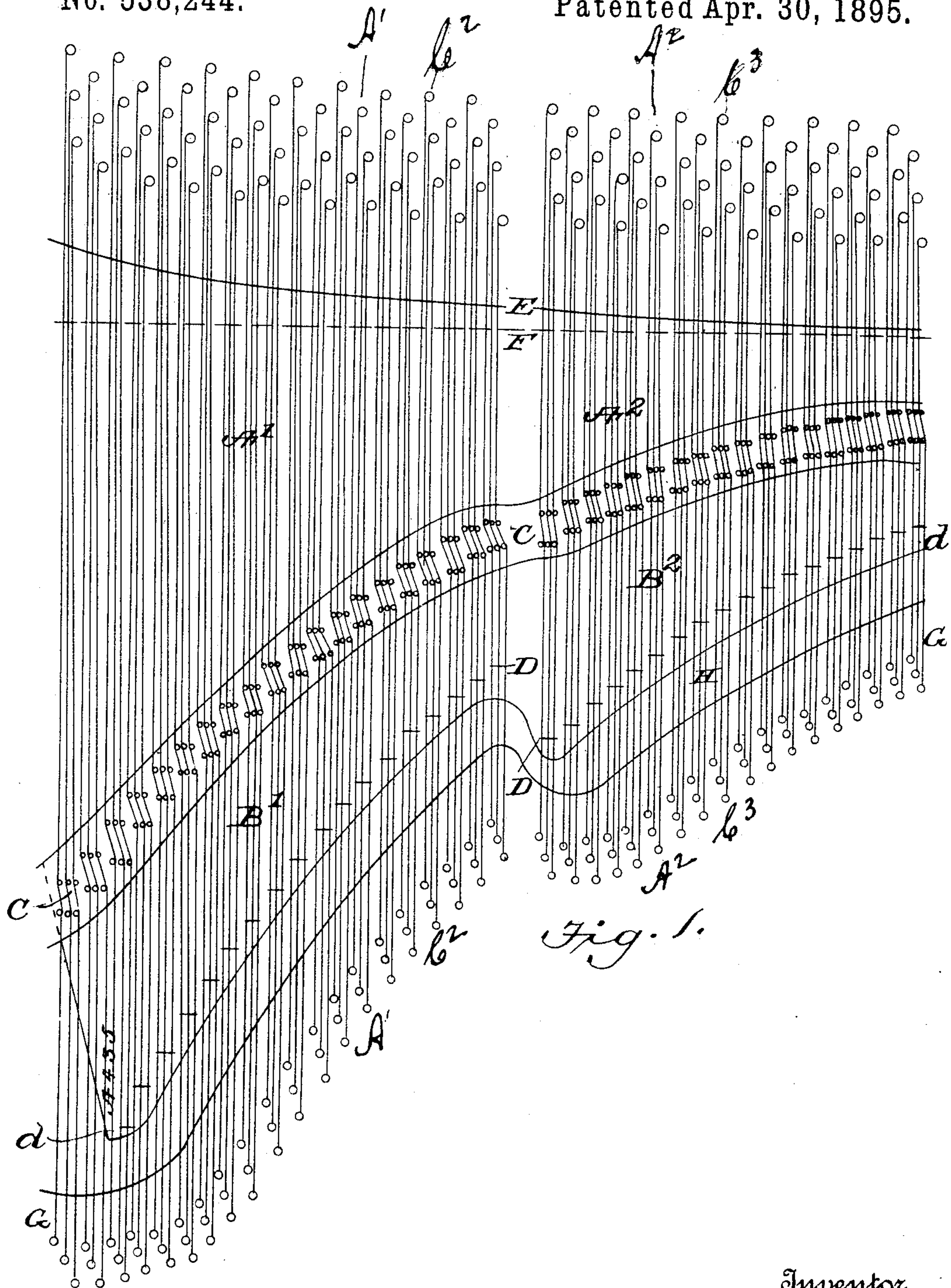
2 Sheets—Sheet 1.

J. EBEL.

HARMONIC SCALE FOR PIANOS.

No. 538,244.

Patented Apr. 30, 1895.



Witnesses  
John D. Amie  
J. A. Baldwin

Inventor  
Julius Ebel  
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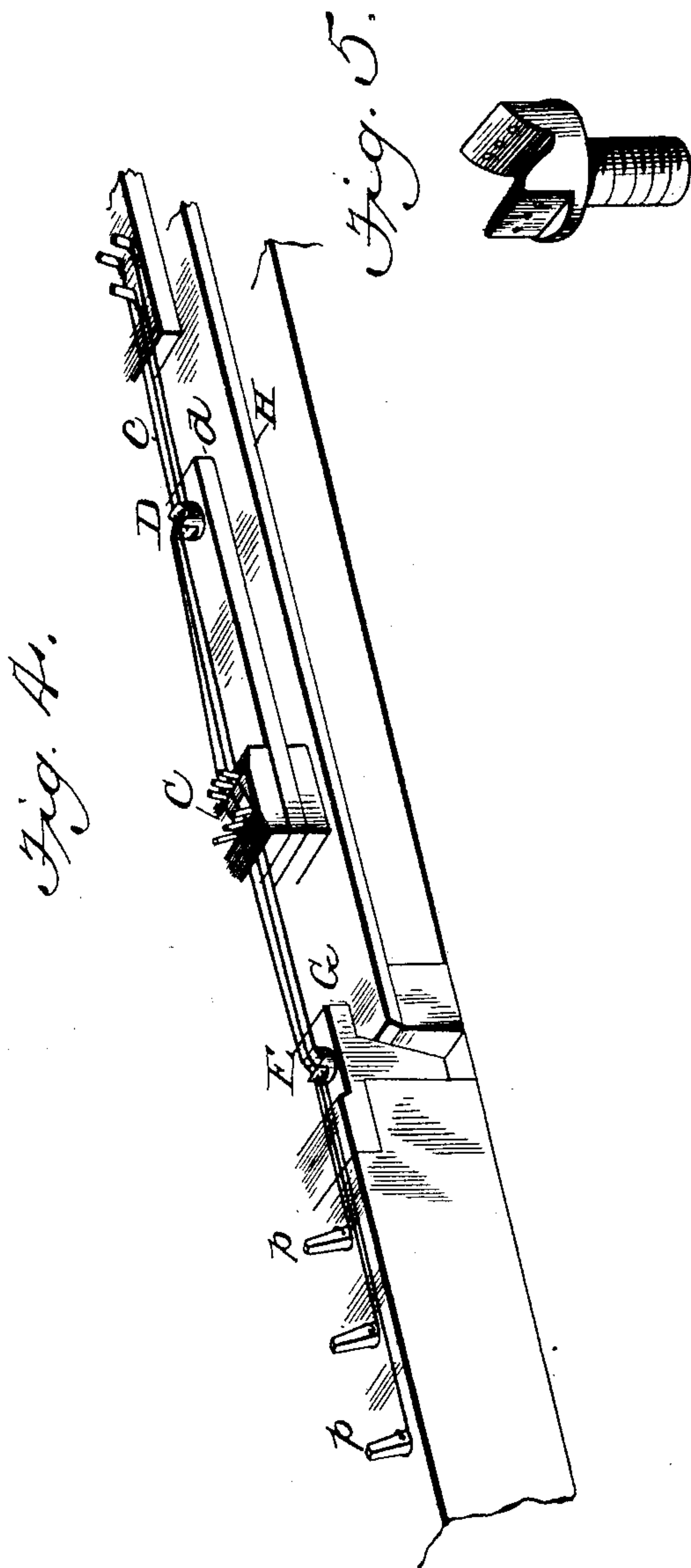
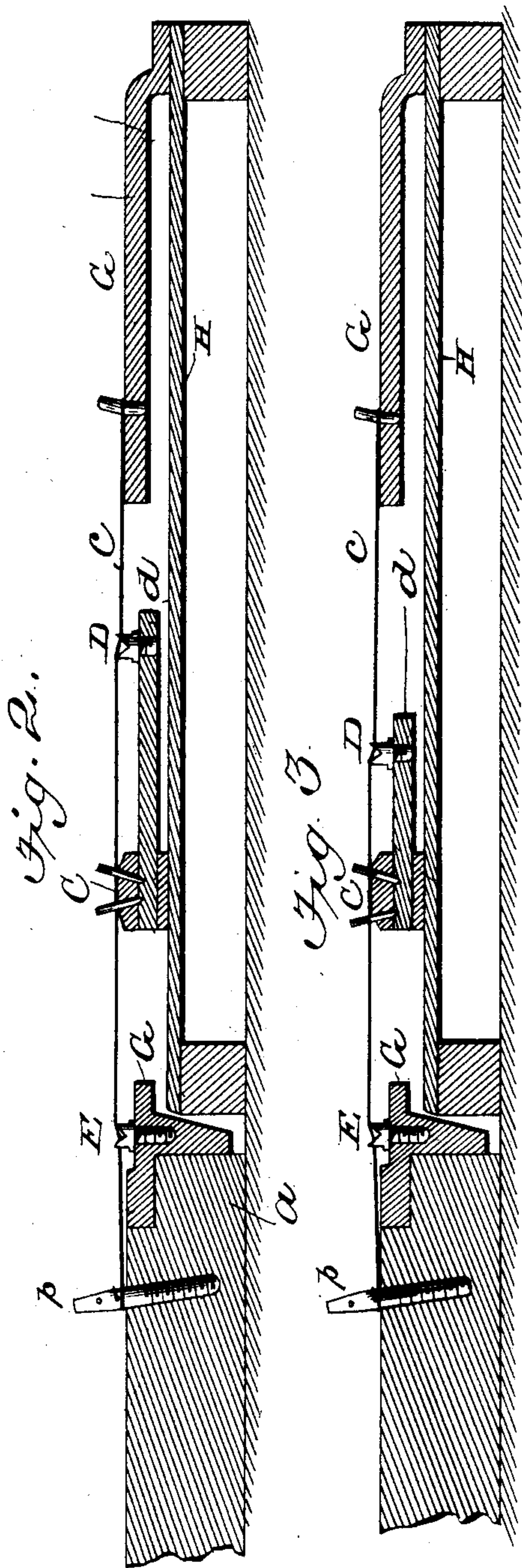
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# UNITED STATES PATENT OFFICE.

JULIUS EBEL, OF JAMESTOWN, NEW YORK.

## HARMONIC SCALE FOR PIANOS.

SPECIFICATION forming part of Letters Patent No. 538,244, dated April 30, 1895.

Application filed January 10, 1895. Serial No. 534,428. (No model.)

*To all whom it may concern:*

Be it known that I, JULIUS EBEL, a citizen of the United States, residing in the city of Jamestown, in the county of Chautauqua and State of New York, have invented certain new and useful Improvements in Harmonic Scales for Parlor and Grand Pianos; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same.

The object of my invention is to make a new harmonic scale for upright and grand pianos, and the improvement consists, first, in making an extension sounding board bridge and providing the same with an extra agraffe or cut off, for each treble string up to A—435; second, in so placing the extra agraffe or cut off to each string that perfect harmony is secured and the sound will take up through the harmonic three times, all of which will be understood by this specification, and the accompanying drawings, in which—

Figure 1 shows a plan or diagram of my improved scale. Fig. 2 shows side elevation of section A<sup>2</sup>, B<sup>2</sup>, of plan view. Fig. 3 shows side elevation of section A', B', of plan view. Fig. 4 shows an isometrical perspective of Fig. 2.

In the diagram, A', and A<sup>2</sup>, show treble sections of a regular upright scale. B', and B<sup>2</sup>, show my improved harmonic scale. C is the bearing end of the bridge; D, extra agraffes on the suspended end of bridge; E, regular agraffe (and agraffe line in diagram). F is the hammer line. G is the metal plate. H is the sounding board.

In Fig. 2, *a* is a tuning pin block, and *b* the tuning pin, both in common form. *c* is the string secured by hitch pin in plate at one end and to tuning pin at the other.

The bridge C is secured to the sounding board throughout the treble or harmonic section, having its bearing end in common form, only I put it up in three sections for the purpose of suspending the middle section rearwardly far enough to receive the extra agraffes or cut offs D, as shown in Figs. 2, 3 and 4. It will be seen that in the short string section A<sup>2</sup>, and B<sup>2</sup>, on diagram, that the extra agraffe on suspended bridge is placed

the same distance from the bearing part of the string on the bridge, that the regular agraffe is from the bridge, thus dividing the strings in this section into two equal lengths, which gives each string double sounding capacity.

In section A', and B', the agraffe on the suspended end of the bridge is placed one half the distance from the bridge that the agraffe at the other end is from the bridge, and this gives the harmonic end or portion of these strings just an octave higher than the main part, and the upper part of which will be in tune with the octave higher, thus giving three foundation powers for each note throughout the scale, all with no extra tuning and the only added cost of the extension on bridge and extra agraffes. This also gives the harmonic without the extra fourth and fifth strings that have formerly been used.

To illustrate more fully the principle involved take C<sup>3</sup> in the extreme treble section A<sup>2</sup> and you get two equal lengths on one note with the same sound, and in unison with C<sup>2</sup> one octave lower in rear end of B', which will make three foundation notes, meaning by that, that in striking one note you get the effect of three notes. For example striking note A' in section A' will take the unison of the three foundation notes—A' in section B'—A<sup>2</sup> in section A<sup>2</sup>—A<sup>2</sup> in section B<sup>2</sup> and so strengthen the sound through the harmonic of the notes three times. This rule will follow throughout the whole scale.

I am aware that parties have put two bridges on the sounding board and further divided the strings into multiples of the prime string, but this is not only expensive but gives only a prolongation of the same sound and will not give the harmonic or extra octave on the same string.

I do not wish to confine myself to the exact number of strings arranged in the sections indicated, as more or less may be used without departing from my invention.

I claim—

1. In piano fortes, the bridge secured to the sounding board and having a long rear extension to receive an extra agraffe or cut off, substantially as shown and for the purpose set forth.

2. In piano fortes, the bridge secured to the

sounding board of the piano, having usual bearing on the sounding board and adapted to receive the strings in the usual way at one end, said bridge having a long rear extension above the sounding board to receive an extra agraffe or cut off for the strings, substantially as shown and for the purpose set forth.

3. In piano fortes, a harmonic string scale consisting of the strings in combination with the sounding board bridge, having a long rear extension provided with the usual string bear-

ings and the additional agraffe cut-offs, whereby the strings are divided into proportional lengths, substantially as shown and for the purpose set forth. 15

In testimony that I claim the foregoing I hereby sign my name in the presence of two witnesses.

JULIUS EBEL.

Witnesses:

S. A. BALDWIN,  
MILO HARRIS.