

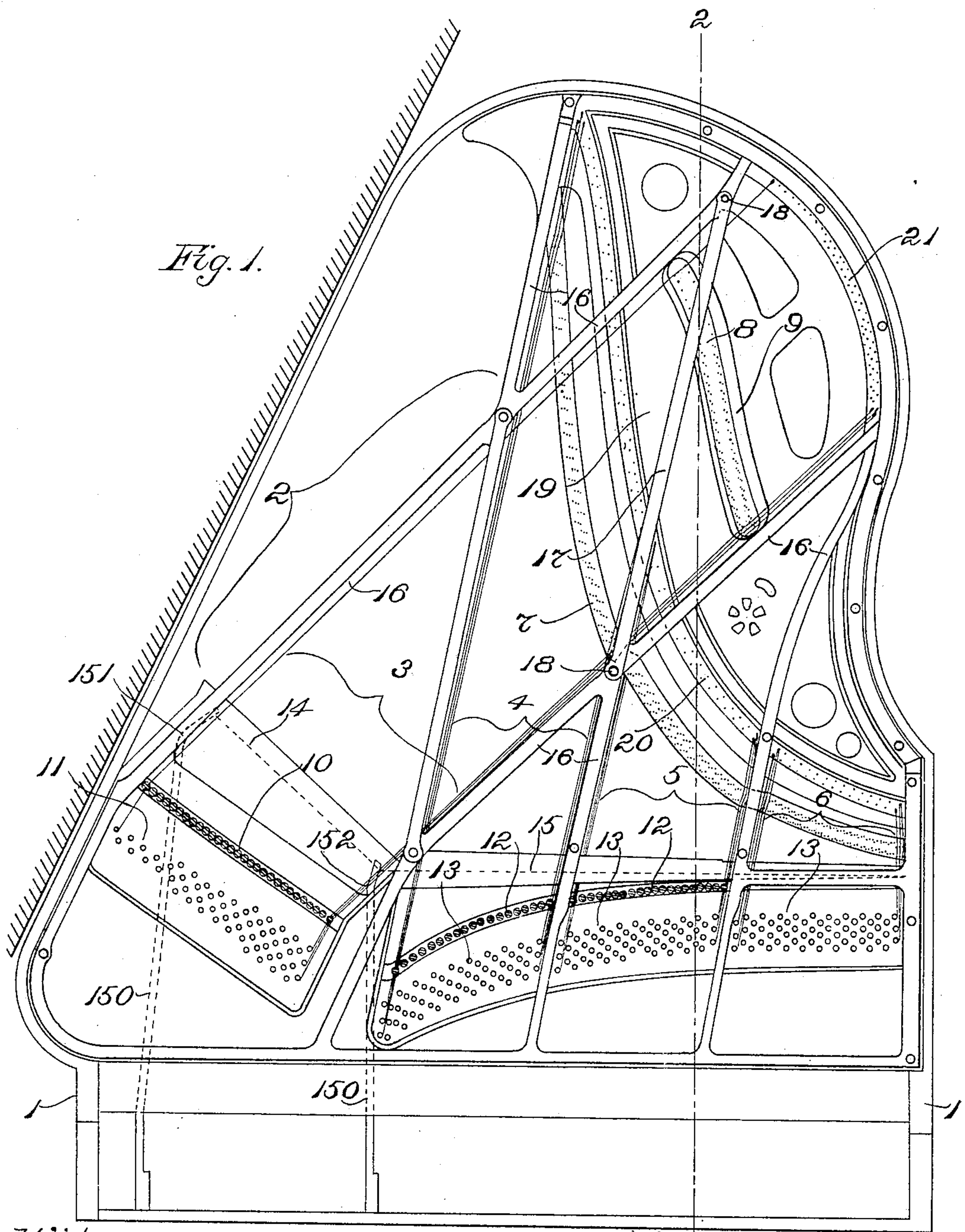
(No Model.)

3 Sheets—Sheet 1.

R. S. BOWEN.
PIANO.

No. 598,693.

Patented Feb. 8, 1898.



Witnesses:

Oscar F. Bill
Edith J. Anderson.

² Inventor:

Robert S. Bowen
by Maceo Calver & Randall
Attorneys.

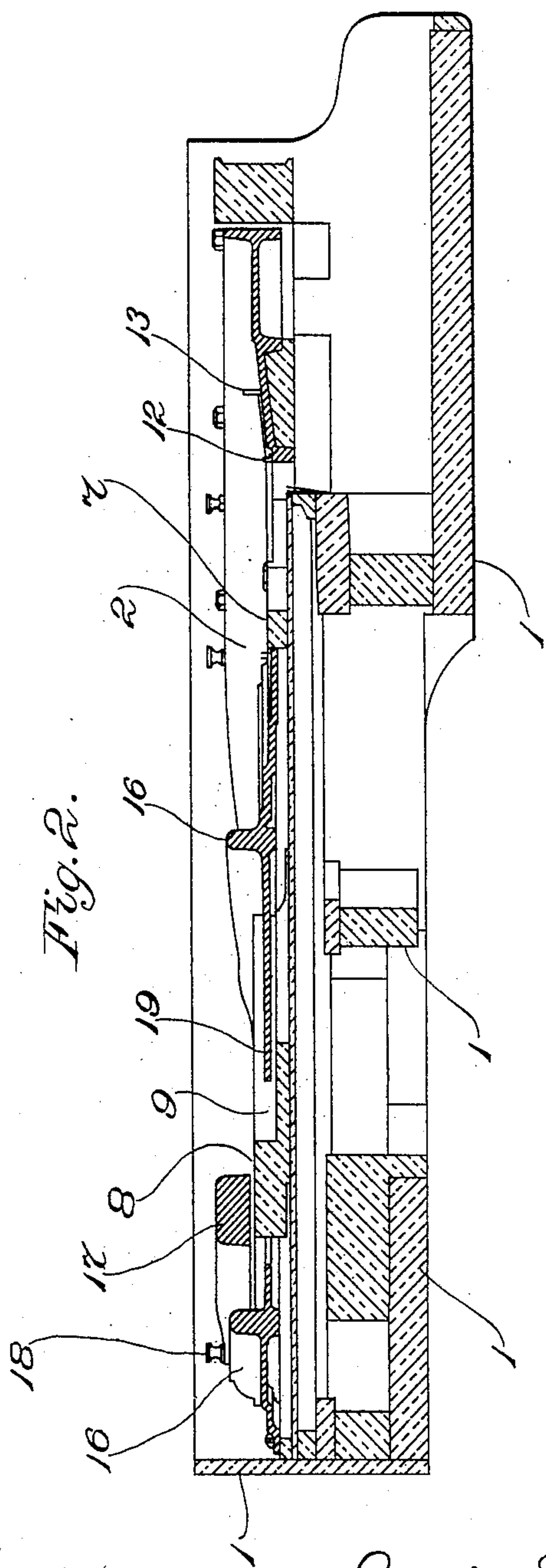
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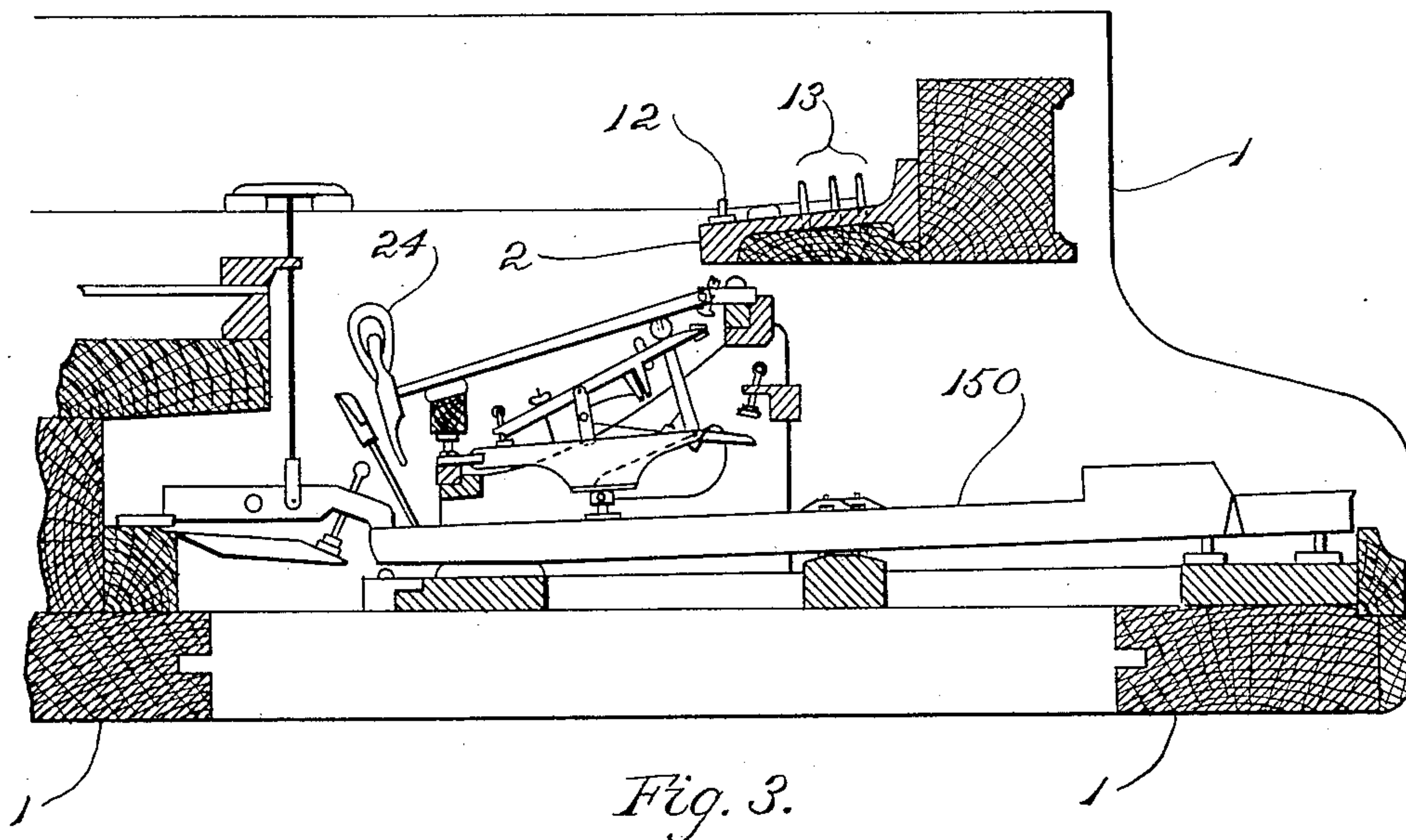
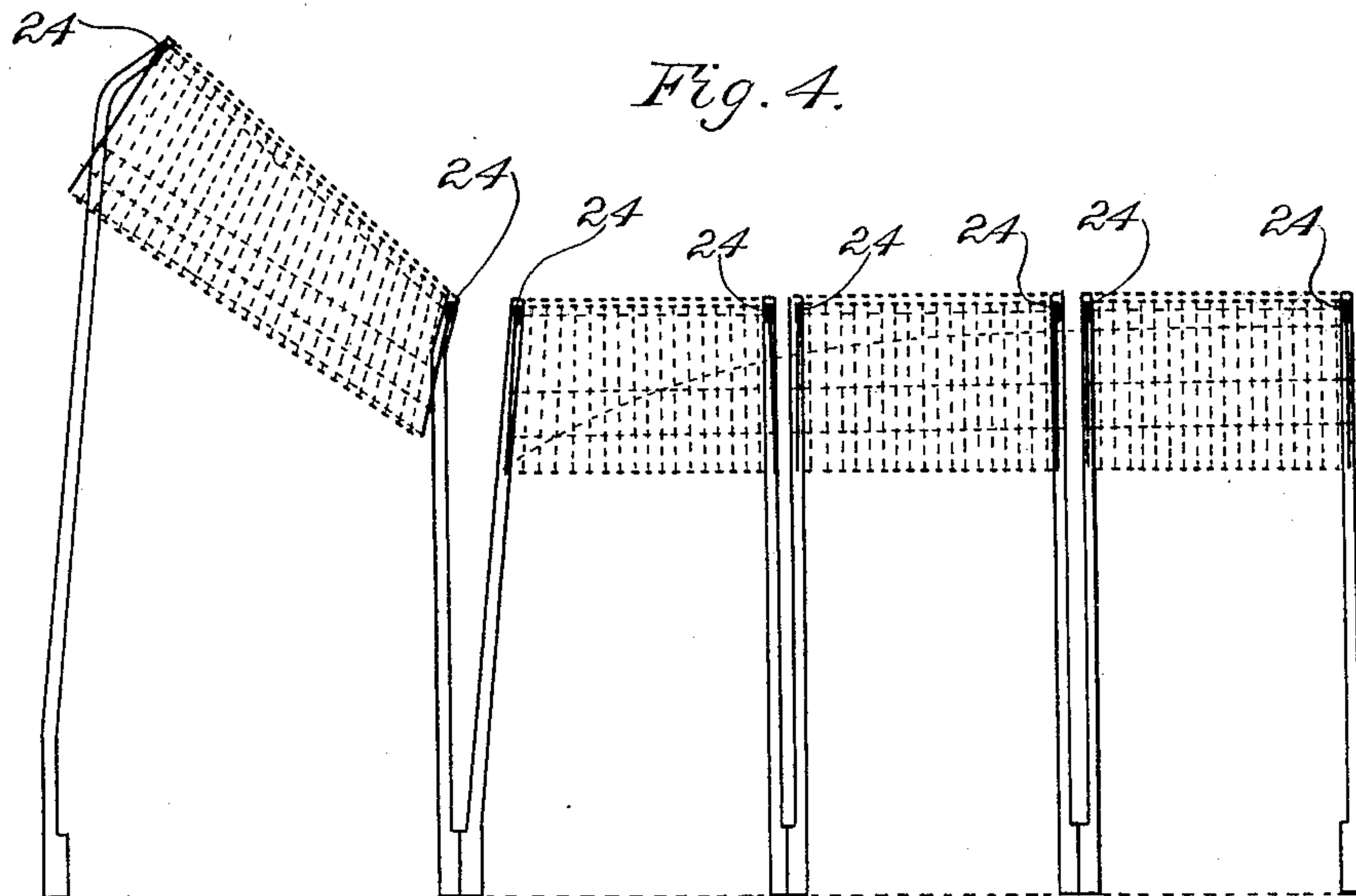
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UNITED STATES PATENT OFFICE.

ROBERT S. BOWEN, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO THE
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PIANO.

SPECIFICATION forming part of Letters Patent No. 598,693, dated February 8, 1898.

Application filed September 13, 1897. Serial No. 651,399. (No model.)

To all whom it may concern:

Be it known that I, ROBERT S. BOWEN, a citizen of the United States, residing at Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Pianos, of which the following is a specification, reference being had therein to the accompanying drawings.

The chief aim or object of the invention is to meet the demand which exists in the market for a small grand piano. In working to attain this aim or object I have sought to reduce the number of square feet of floor-space to be occupied by an instrument and also sought to give to the widest portion of the instrument a minimum of width in order that the casing of the instrument—that is to say, the most prominent or extreme outer portion thereof—shall project to a minimum extent from the wall-line of the room containing the instrument when the instrument is placed against the wall. Other aims or objects thereof are to improve the construction and arrangement of the parts of a piano.

The invention relates more particularly to the string-support or plate, the strings which are applied thereto, the agraffes, and the key-levers; and it consists in an improved construction and arrangement whereby I am enabled to reduce the proportions and dimensions of the plate and thereby reduce the proportions and dimensions of the casing as well as maintain the length or width of the projecting portion of the instrument at the minimum, and thus am enabled to effectuate the first-mentioned aim or object aforesaid.

One feature of the invention, as hereinafter set forth, is designed with the purpose in view of facilitating the making of the plate and reducing the cost thereof. Other features are designed to improve the character and quality of the instrument.

The invention will be described first with reference to the accompanying drawings, wherein I have illustrated the best embodiment thereof which I have yet contrived, after which the distinguishing characteristics of the invention will be particularly pointed out, and distinctly defined in the claims at the close of this specification.

Figure 1 of the drawings is a view in plan

of certain portions of the casing of a piano and a plate containing the said embodiment of the invention and indicates by a sectional representation a portion of a wall against which the piano is placed. Fig. 2 is a view in vertical section on the line 2 2 of Fig. 1 looking toward the right. Fig. 3 is a view in vertical section chiefly intended to illustrate the piano-action. Fig. 4 is a view in plan on the order of a diagram intended to illustrate the relations, &c., of the hammers and key-levers.

1 designates various portions of the casing of a piano. Within this casing is placed the plate 2. To this plate are applied in practice the various strings or wires. For the sake of securing greater clearness the most of these latter have been omitted from the drawings, inasmuch as the manner of applying them will be obvious to those who are skilled in the art.

The usual arrangement of the strings or wires of a grand piano is in four groups. Three of these groups of strings or wires—namely, those which correspond with the groups which in the drawings are designated 4, 5, and 6 in Fig. 1—extend usually from front to rear in one plane, as in the case of those illustrated, while the fourth group of strings or wires, it corresponding with the group which is designated 3 in Fig. 1, is arranged in a different horizontal plane above the others, this group crossing the direction of the others more or less obliquely—that is to say, being overstrung. This group last mentioned comprises the bass strings.

An advantage incident to having the bass strings overstrung is the fact that it enables the strings of the remaining three groups to be spread or distributed more widely over the bridge 7, thereby giving freer tone. The overstringing of the bass strings is adopted or resorted to for the purpose of enabling the bridge therefor, the latter corresponding with the bridge which is designated 8 in the drawings, it fitting within the opening 9 of the plate, to be brought or located nearer to the center of the sounding-board than it would be if the bass strings were not obliquely disposed and overstrung.

Near the front end of the plate of a grand

piano, as illustrated herein in the case of the plate 2, are located the agraffes for the bass strings, such agraffes being designated herein 10, the tuning-pins for the said strings, such tuning-pins being designated herein 11, the agraffes for the remaining strings, such agraffes being designated herein 12, and the tuning-pins for the said remaining strings, these last-mentioned tuning-pins being designated herein 13. Customarily the plate is so constructed and the strings are so applied thereto and disposed thereon as to locate the striking-points of all the strings in the four groups in one straight line extending across the front portion of the piano and parallel with the front end of the piano—that is to say, the keyboard end.

As is well-known, the respective strings of a piano vary in length, those of the highest pitch being the shortest, while the length increases as the pitch lowers, except that the very lowest or gravest are reduced in length by being loaded. As is well known also, the striking-point of each string is at a point in its length that is proportional to its length, such point varying from a position at about one-fifteenth in the case of the treble to a position at one-seventh in the case of the bass. It follows from the variation in the positions of the striking-points on the strings that when all the striking-points are kept in one straight line that is continuous across the piano from one side thereof to the other the agraffes must occupy positions at various distances to the front of such straight line of striking-points—that is to say, the line of agraffes must curve or incline away from the line of striking-points in proceeding from the treble end to the bass end. In point of fact, the line of agraffes does project to a considerable extent in the usual grand piano to the front of the line of striking-points at the portion thereof to which the bass strings are applied. It will be borne in mind that in addition the tuning-pins are located to the front of the agraffes. When the group of bass strings is caused to occupy an oblique position, this position of said strings requires some of the agraffes for such strings to be located farther out to one side than the end of the line of striking-points and also requires the corresponding tuning-pins to be located out farther to the same side than the end of the series of agraffes, thereby causing a lateral projection of the series of agraffes and a still farther lateral projection of the series of tuning-pins for the bass strings beyond the end of the line of the striking-points. Moreover, this oblique position of the bass strings necessitates in addition a wider spacing apart of the agraffes therefor in a piano in which the striking-points on the strings are kept in a straight line across the piano, inasmuch as the greater the extent to which the strings are inclined with relation to the line of agraffes the closer will the strings be brought to each other. In other words, when the line of agraffes extends at right an-

gles across the group of bass strings the latter will be spaced at a distance apart corresponding with the spacing of the agraffes throughout the whole length of the parallel portions of the strings. The greater the angle at which the line of agraffes crosses the group of strings the closer together will the parallel portions of the strings become, assuming the spacing of the agraffes to remain as at first. Hence when the bass strings are given an inclined or oblique position it has been found necessary to space apart the agraffes, &c., more widely than before in order to separate the strings to the extent which is required for the attainment of the best results. The greater the obliquity of the bass strings with reference to the other strings the greater has had to be the increase in the length of the line of striking-points.

From the foregoing it will be perceived that the proportions and dimensions of the front portion of the plate of a grand piano having the striking-points of the strings disposed in a straight line across the same are increased by overstringing the bass strings, that the dimensions of the corresponding part of the case are likewise increased, and that the increase is proportionate to the obliquity of the bass strings, this following in part from the fact that the strings require to be spaced apart more widely than before on the line of striking-points and also in part from the fact that the oblique position of the wires compels the line of agraffes to be extended past the end of the line of striking-points and the series of tuning-pins to be extended past the end of the series of agraffes.

In carrying my invention into effect I depart from the established principle of maintaining the striking-points of the wires in one line across the piano. I overstring one group of strings, as 3, relatively to the remainder, but I dispose the striking-points of these overstrung strings 3 in a line, as indicated by the dotted line at 14, Fig. 1, which is inclined at an angle to the line, as 15, Fig. 1, in which the striking-points of the remaining strings are arranged. In order to effectuate this, I arrange the piano-action so that the hammers 24 24 pertaining to the overstrung strings shall strike the latter at points located along a line which is disposed at an angle to the line of striking-points of the remaining strings—that is to say, the line passing through the points on the latter wires on which the hammers 24 24 thereof strike the same. This angle is approximately a right angle. I also arrange the line or series of agraffes 10 pertaining to the overstrung strings 3 in a position at a corresponding inclination or angle relatively to the line or series of agraffes 12 pertaining to the remaining strings 4, 5, and 6, the said line or series of agraffes 10 being disposed approximately at right angles across the group of strings 3, and I arrange the tuning-pins 11 for such overstrung wires 3 in a correspondingly-inclined series—that is to

say, at an angle to the series of tuning-pins pertaining to the strings 4, 5, and 6 and also approximately at right angles to the group of strings 3. Thereby I bring the striking-points of the strings 3 in a line which crosses the group composed of such strings approximately at right angles.

Fig. 3 of the drawings shows an action of usual character interposed between the key-lever 150 and the corresponding hammer 24. Inasmuch as any suitable or approved form of action may be employed and as the action is not involved directly in my present invention no specific description thereof is required herein. Fig. 4 shows, diagrammatically, the arrangement, relations, &c., of the various key-levers, hammers, &c., only certain thereof being shown in full lines, the greater part of the key-levers being omitted for the sake of clearness and simplicity, while with the same end in view the greater part of the hammers are indicated by dotted lines.

From the foregoing flow various advantages of practical importance. Thus the strings are spaced at the requisite distances apart with a minimum separation of the agraffes 10, &c., from one another, which enables the line or series of said agraffes to be reduced to the minimum length. This follows from the fact that a line crossing the group of strings 3 at or approximately at right angles measures less in length than any line crossing such group at a greater obliquity or inclination and the further fact that the divisions of the former line produced by the intersections of the strings are less in length proportionately than those into which the oblique line is divided. The position of the line of agraffes 10, approximately at right angles to the group of strings 3, as an incident to permitting the length of such line to be reduced, permits the transverse length of the front end of the plate or string-support to be reduced correspondingly beyond what would be possible otherwise with an obliquely-disposed group of strings, thereby allowing a corresponding reduction to be made in the transverse length of that portion of the casing which comes next in the rear of the keyboard. This lessens the extent to which the keyboard end of the instrument projects from the wall-line of the room in which the instrument is placed. In addition it permits the overstrung strings 3 to be swung around into a more greatly inclined or oblique position with relation to the strings 4, 5, and 6 than would be advantageous ordinarily. With my invention applied this may be effected without adding to the length of the front end of the plate or string-support, whereas under the preëxisting construction and arrangement the said length would be increased to an undesirable extent. I am thereby enabled to locate bridge 8 in a most central position relatively to the sounding-board, which is a highly-important advantage. The increased obliquity of the overstrung strings,

moreover, enables the rear portion of the instrument to be reduced in dimensions transversely, while the length of the instrument from front to rear at the treble end of the keyboard is greatly reduced.

In carrying the foregoing portion of the invention into effect I form the respective key-levers 150 of the series pertaining to the overstrung strings of progressively-increasing lengths, beginning at the higher-pitched end of the series of strings 3 and proceeding toward the lowest or gravest strings, (see particularly Fig. 1,) thereby enabling the rear ends of such key-levers to be located adjacent the inclined line of striking-points. To enable the said key-levers 150 to coact properly with hammers, &c., of usual character, I form certain thereof with bends at 151 and 152, which locate the rear ends of the respective levers in proper position relative to the corresponding strings. This obviates any complication or difficulty with the hammers and adjacent parts.

The stiffening and strengthening of the form of plate which is shown in the drawings presents some difficulties, this being the case in particular in the portion thereof which has the strut 17 applied thereto, since the underlying portion 19, in which opening 9 for bridge 8 is formed, cannot have a strut such as that designated 17 cast integral therewith, and yet the character and direction of the calculated strains necessitate the employment of a strut corresponding with that mentioned. The overstrung wires 3 pass between the strut 17 and the said web 19. The undertaking to cast such strut integral with the other portions of the plate, while leaving it disconnected save at its ends, is expensive, tedious, and accompanied by failures. I form the said strut as a separate and detachable piece, shaped to leave a suitable space between it and the surface of web 19 and attach its extremities to the integral struts 16 16 by bolts 18.

20 are the hitch-pins for the rear ends of the treble strings, and 21 are those for the rear ends of the bass strings.

I claim as my invention—

1. The combination with the string-support or plate having the strings applied thereto with one portion overstrung with relation to the remainder, of the piano-action having the hammers thereof arranged to strike the overstrung strings at points located along a line which is disposed at an angle to the line of striking-points of the remaining strings, and approximately at right angles across the group of overstrung strings, substantially as described.

2. The improved string-support or plate having the strings applied thereto with one portion overstrung with relation to the remainder, and having the agraffes of such overstrung strings disposed in a line or series at an angle to the line of agraffes of the remaining strings, and approximately at right angles

to the group of overstrung strings, substantially as described.

3. The improved piano having one portion of the strings thereof overstrung with relation to the remainder, also having the agraffes of the overstrung strings disposed in a line or series at an angle to the line of agraffes of the remaining strings and approximately at right angles to the group of overstrung strings, and also having in connection with the overstrung strings a series of key-levers progressively increasing in length, and also bent, substantially as described.

4. The improved string-support or plate having the web 19, strings applied to suitable supports on the string-support or plate, and the separate and removable strut 17 secured at its ends and overlying the said web and the overstrung portion or group of strings, substantially as described.

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

ROBERT S. BOWEN.

Witnesses:

CHAS. F. RANDALL,
WM. A. MACLEOD.