

(No Model.)

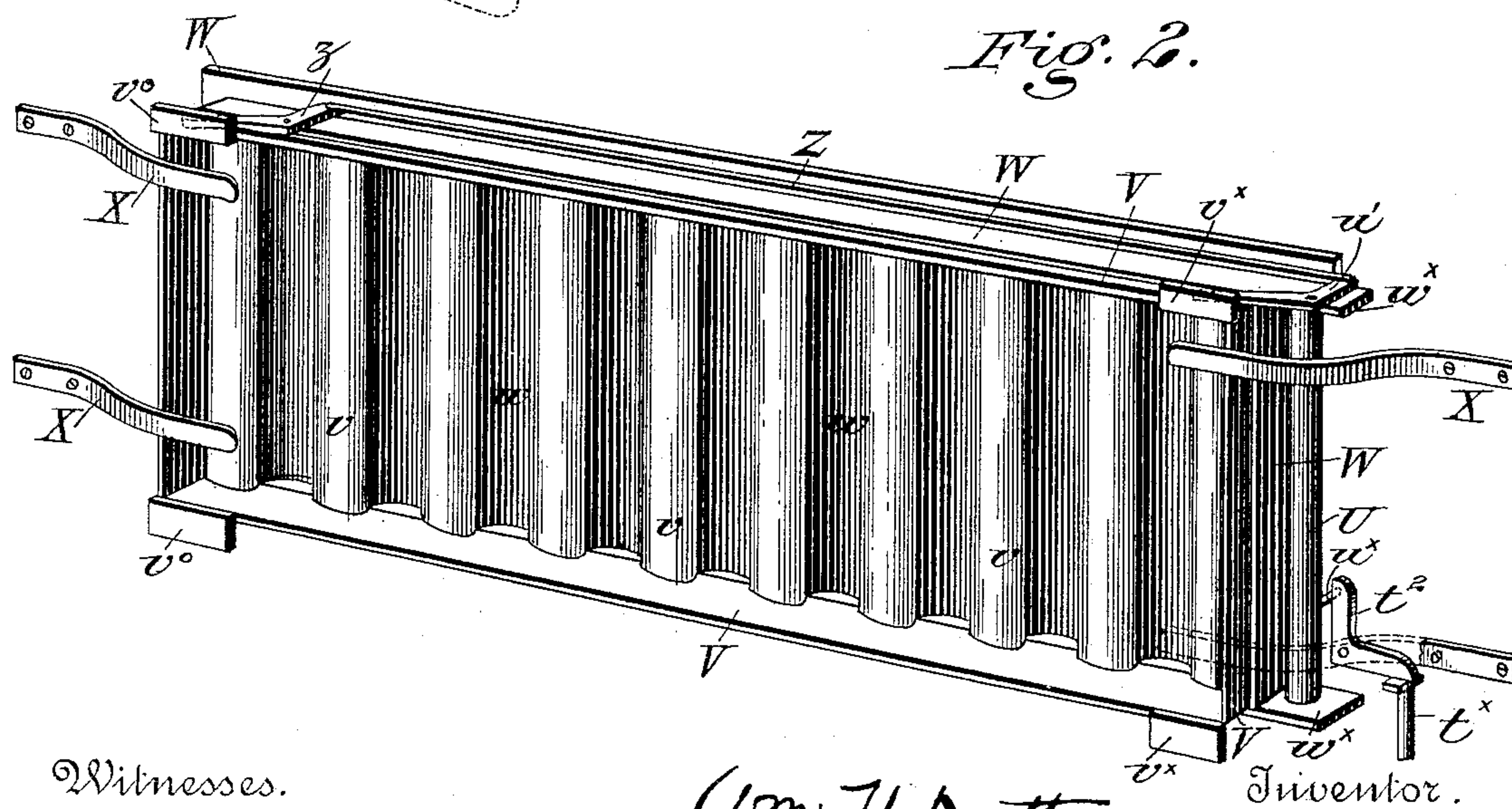
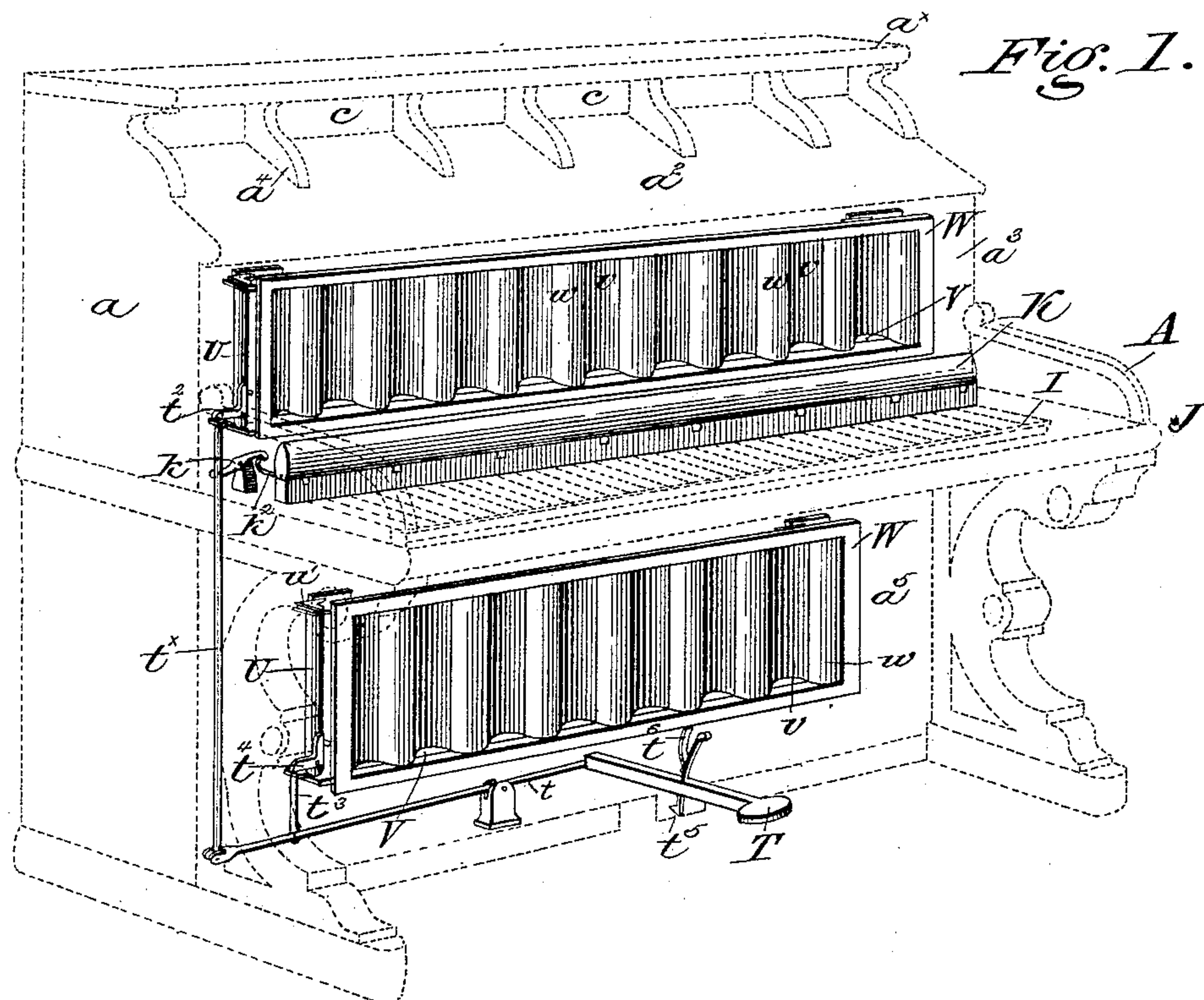
3 Sheets—Sheet 1.

W. H. DUTTON.

UPRIGHT PIANO.

No. 384,244.

Patented June 12, 1888.



Witnesses.

P. F. Hagle.
John J. Taylor

Wm H. Dutton.

By his Attorney,

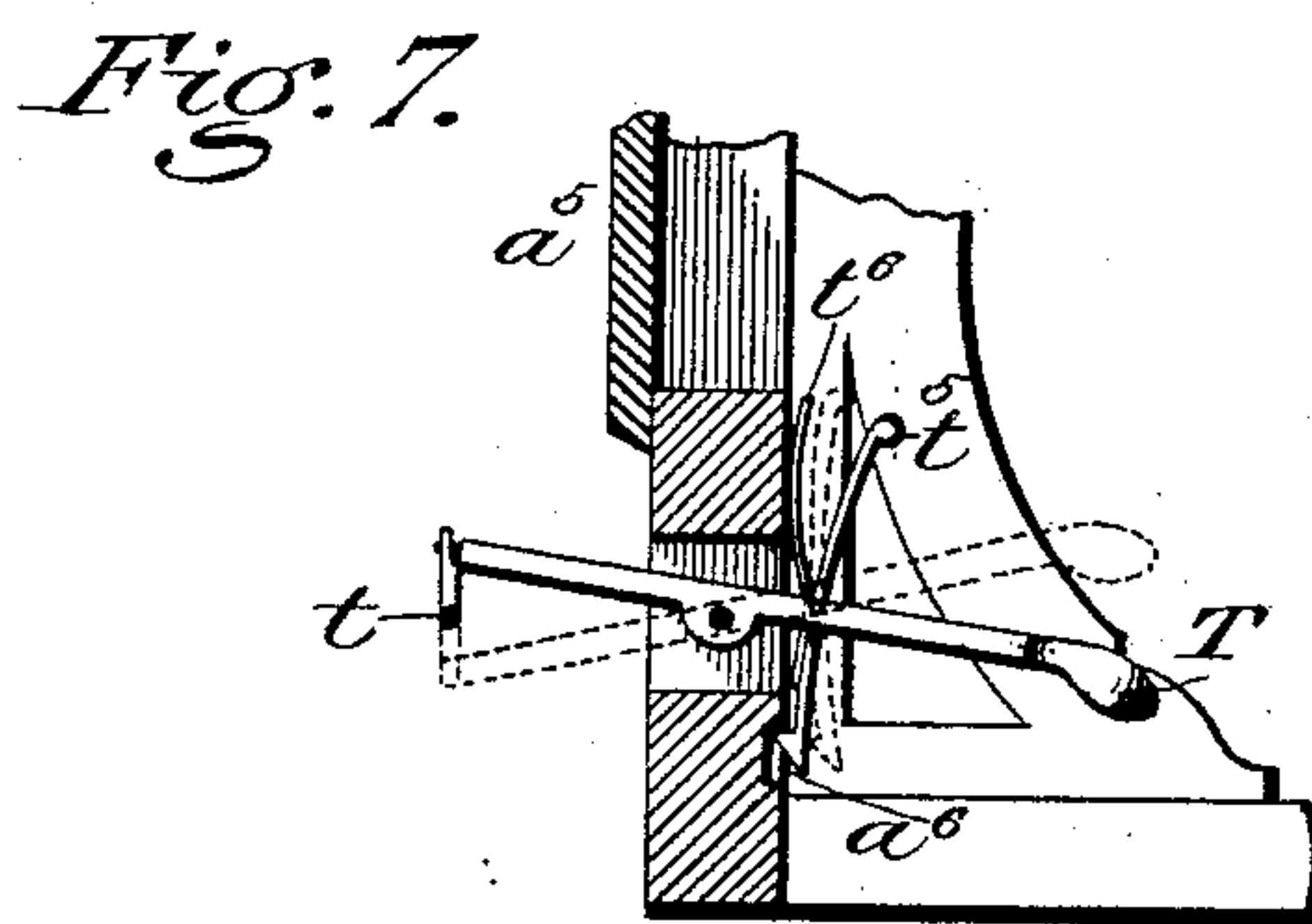
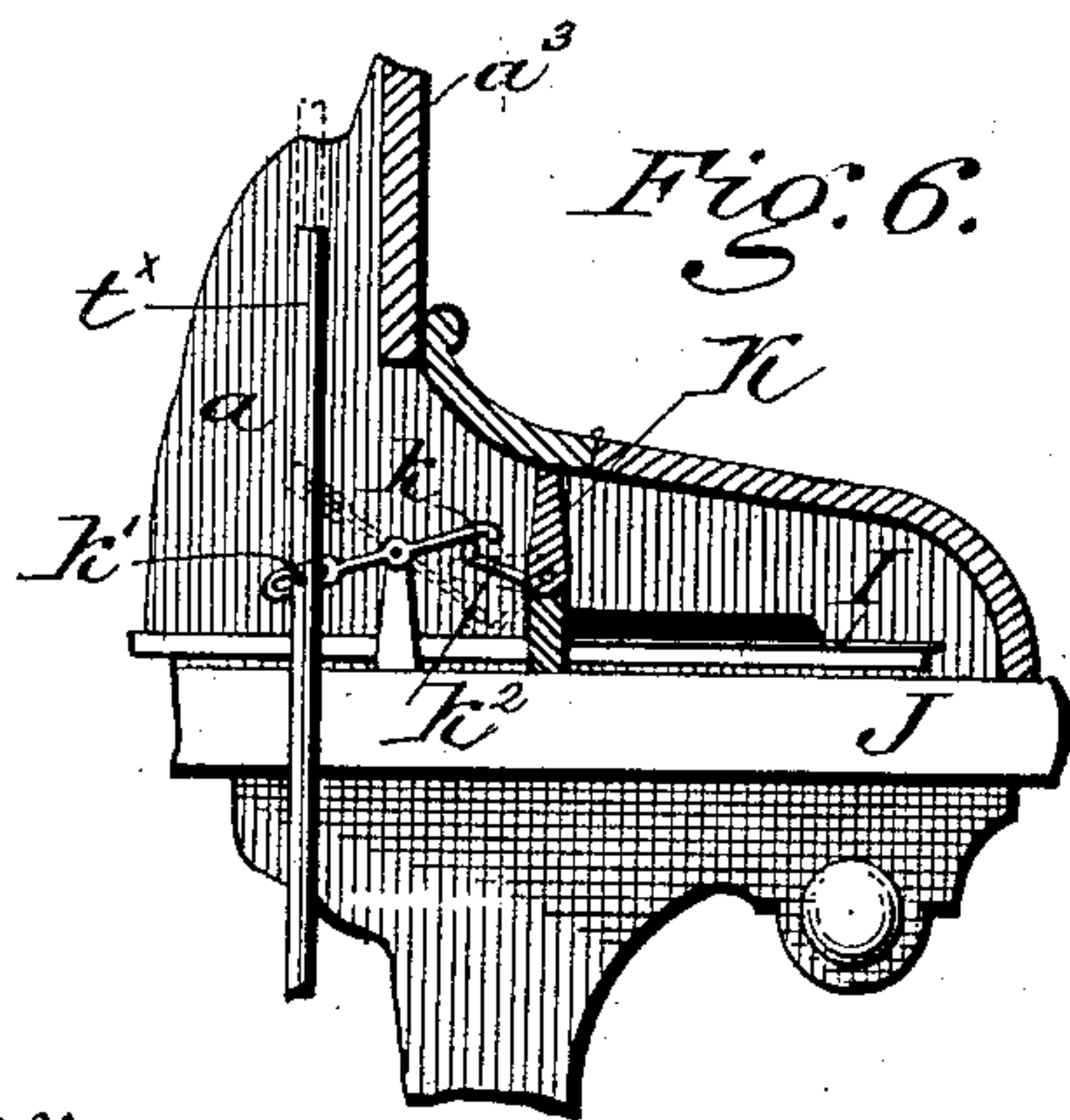
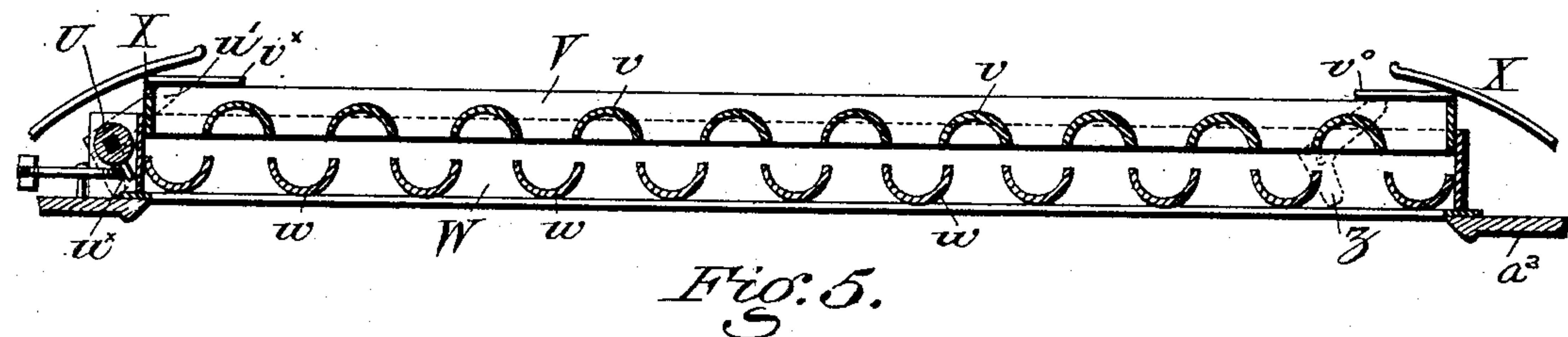
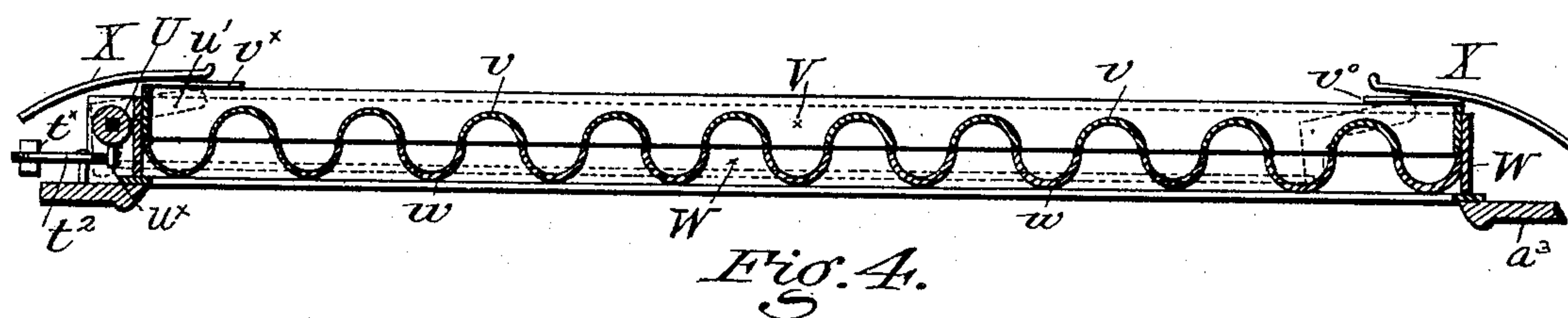
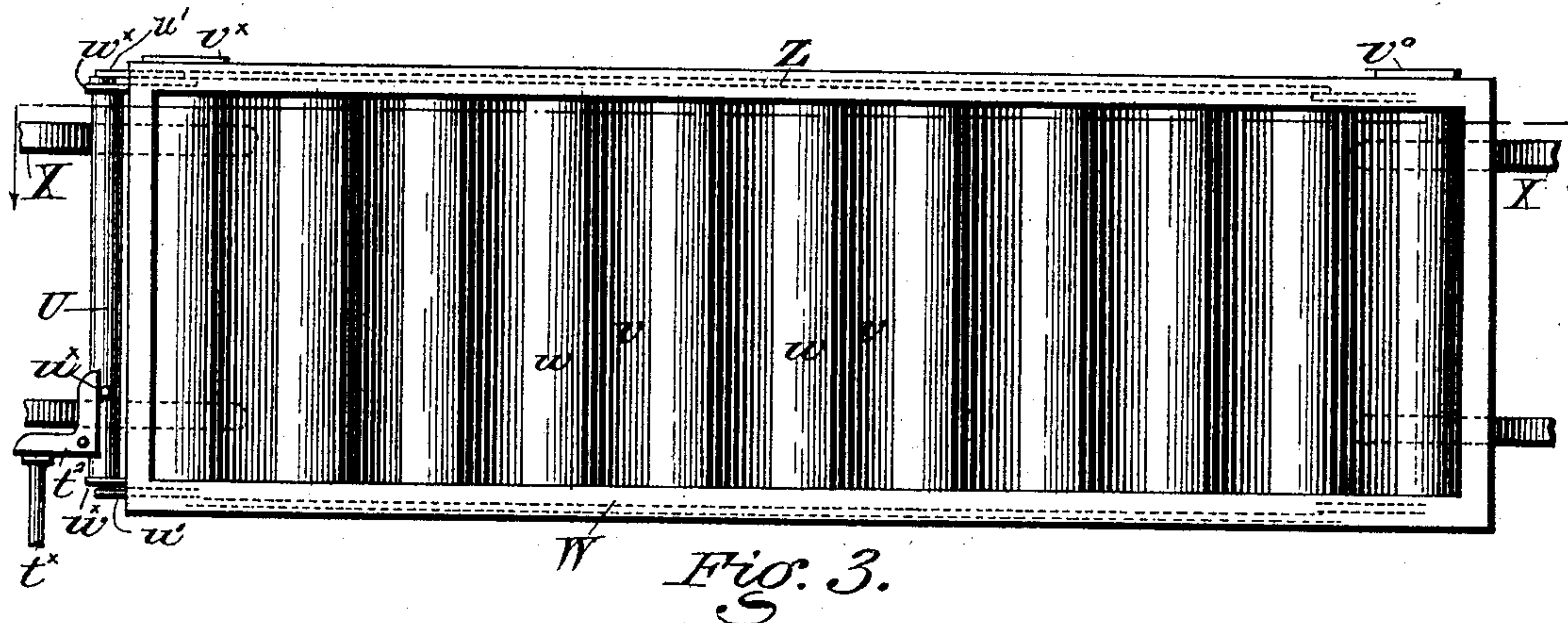
W. C. Strawbridge
Bonsall Taylor

Inventor.

UPRIGHT PIANO.

No. 384,244.

Patented June 12, 1888.



Witnesses
P. F. Tagle.
John Polley Jr.

Wm H. Sutton, Inventor
By his Attorneys,
W C Strawbridge
Bonsae Taylor

(No Model.)

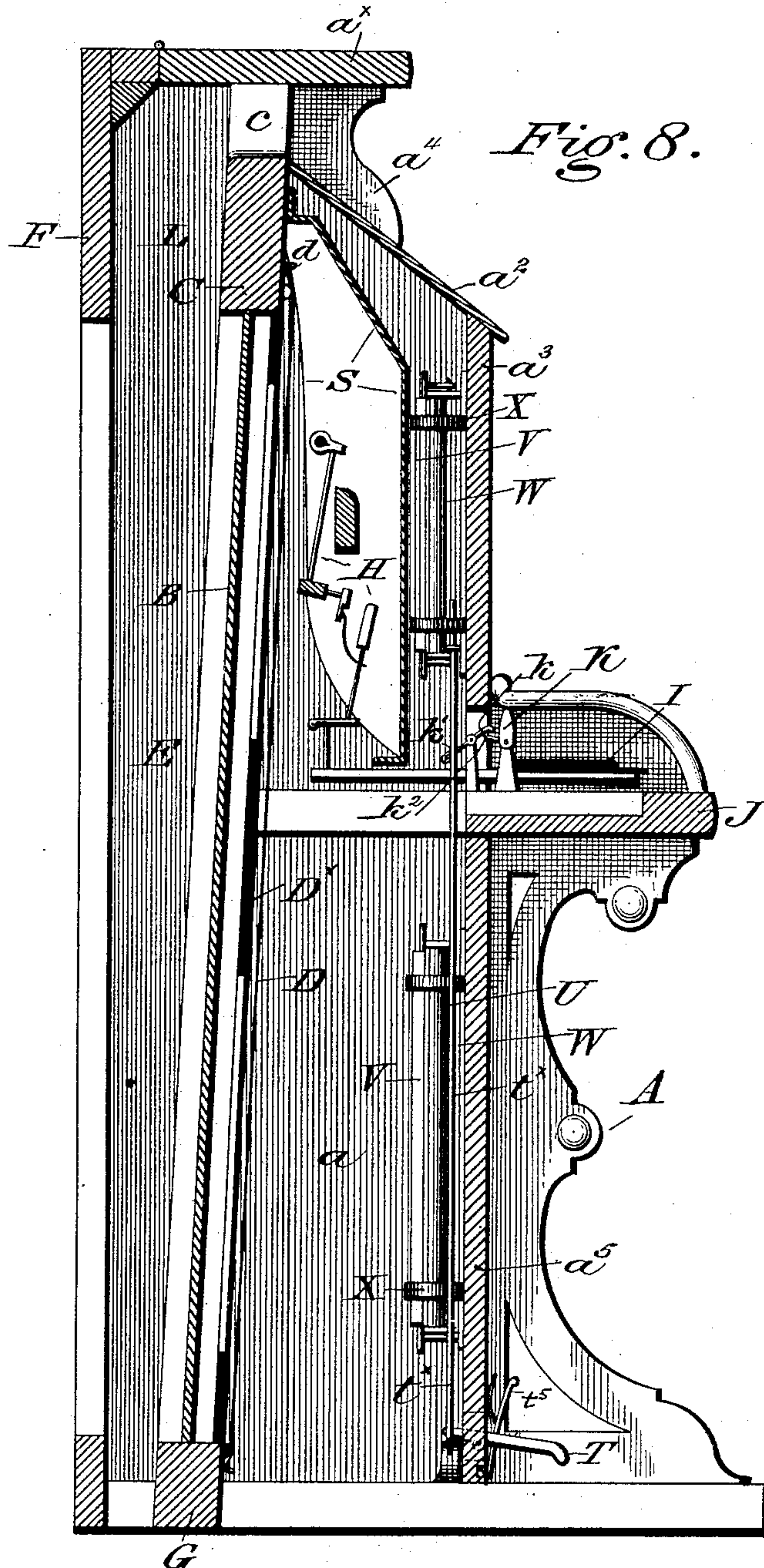
3 Sheets—Sheet 3.

W. H. DUTTON.

UPRIGHT PIANO.

No. 384,244.

Patented June 12, 1888.



Witnesses
P. F. Chagle.
John J. Kelley.

Inventor
Wm. H. Dutton,
By his Attorneys,
W. C. Lawrence,
Bonsall Taylor.

UNITED STATES PATENT OFFICE.

WILLIAM H. DUTTON, OF PHILADELPHIA, PENNSYLVANIA.

UPRIGHT PIANO.

SPECIFICATION forming part of Letters Patent No. 384,244, dated June 12, 1888.

Application filed March 12, 1887. Renewed February 20, 1888. Serial No. 264,626. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM H. DUTTON, a citizen of the United States, residing in the city and county of Philadelphia, in the State of Pennsylvania, have invented certain new and useful Improvements in Upright Pianos, of which the following is a specification.

My invention is applicable in general to that class of pianos which are technically known as "uprights," and in which the sounding board proper occupies a vertical or approximately vertical plane.

My invention is, however, especially applicable in connection with an upright piano invented by me, the upper portion or head of the frame-work of which is of skeleton or box-like structure, in order to render said head of said frame-work a musically vibratory framing, and to cause said head to embody tone conductors opening through the top of the instrument,—application for patent for which was filed October 9, 1886.

My invention is also applicable in connection with an upright piano invented by me, the top portion or head of the framework of which is provided with channels or tone conductors having forwardly facing mouths, application for patent for which was duly filed July 1, 1887, as Serial No. 243,057.

My invention is further applicable in connection with a certain upright piano invented by me, and having a sounding dome or sounding board in front of the action, application for patent for which was executed by me, and filed as Serial No. 230,579 contemporaneously with this application.

The object of my present invention is the improvement of the musical quality and tone of upright pianos in general, by the provision of a piano casing, adapted to incase the frame-work and the action, the front of which casing is virtually a sounding board,—a certain portion of it, namely the sounding deflector hereinafter described, being true sounding board, and another portion of it, namely the panel portions of the front, containing adjustable sounding and reverberating slats, which, when closed, subserve the purpose of a sounding board, and, when open, subserve the purpose of a reverberating device,—the said deflector and slats serving, when conjointly employed, to transmit and magnify the musical tone from

the vibration of the strings, to afford vent to the full tone and power of the vibrations, and, by reverberating them, to improve their quality.

The foregoing objects I attain by a construction a good form of a convenient embodiment of which is represented in the accompanying drawings and described in this specification, the particular subject matter claimed as novel being hereinafter definitely specified.

At the outstart, it is proper for me to state that I contemplate employing the sounding deflector in casings the fronts of which are paneled in the usual manner;—that I contemplate employing the reverberating slats without the sounding deflector, and either in the upper casing panel or that panel which is above the key board, or in the lower casing panel or that panel which is below the key board, or, again, in both;—that I contemplate the employment of the said deflector and slats, either separately or conjointly, in connection with any form of upright piano;—but that I prefer to employ them both, in connection with an upright piano embodying each of the three inventions for which I have made applications as hereinbefore mentioned, in order to effectuate the construction of an instrument in which are united all of the advantages which are separately incident to each of the said recited inventions.

In the accompanying drawings, Figure 1 represents in perspective a piano embodying my improvements, the casing, key board, sounding deflector, and frame-work, being represented in dotted lines, and the sounding and reverberating slats, their frames, and certain convenient devices for operating them, being alone shown in full lines. Fig. 2 is a perspective view from the rear, of the fixed and sliding slat frames and the devices for moving the one within the other, the panel frame to which the fixed slat frame and the springs of the sliding slat frame are secured, being, for clearness, omitted. Fig. 3 is a front elevational view of the frames represented in Fig. 2, the panel frame being supposed omitted. Figs. 4 and 5 are, respectively, sectional plan views in the plane of the dotted lines *x x* of Fig. 3, of the frames shown in said figure,—representing, in Fig. 4, the parts in the positions which they occupy when the frames are moved to

gether and the openings between the slats consequently closed, and, in Fig. 5, the said parts in the positions which they occupy when the sliding frame is moved backward to form openings between the slats. Fig. 6 is a fragmentary side sectional elevation of the key board well. Fig. 7 is a similar view of the slat pedal and the spring catch for maintaining it depressed. Fig. 8 is a side, sectional, elevation of the instrument represented in Fig. 1, the side of the casing nearest to the eye being supposed removed.

Similar letters of reference indicate corresponding parts.

15 In the drawings, A is the casing which, except as to its front face, may be of any usual or preferred character; *a* are the solid sides thereof;

20 B is the sounding board, which occupies a plane slightly inclined from the vertical, is stepped or fastened at its base in any usual manner, and as to its upper portion is connected with a pin block C, which is an integral portion and the front face of the head of the frame-work of the instrument.

25 D are the strings; D^x the iron plate for said strings; and *d* the tuning keys in the pin block with which the strings are connected.

30 E are the usual vertical framing studs of the frame-work, spaced apart such distance as is usual, framed at their upper portions between the pin block C at the front and a transverse back board F at the back, and, at their lower portions framed to the base block G, or otherwise supported and maintained as convenience of manufacture may dictate.

35 *a*^x is a solid or imperforate cover or lid to the casing, preferably fixedly attached.

40 H is the key action, which may be of any preferred character;

I are the keys; and J the key bottom upon which said keys are mounted.

45 Each framing stud is from its base block or basal support throughout its extent to the top level of the head, independent of and disconnected from every other framing stud; so that between said studs and the pin block and the back board are formed continuous interspaces, channels, passage-ways, or openings, which I term tone conductors L, and which extend 50 completely up to the under level of the imperforate cover or lid of the casing.

55 By virtue of the foregoing construction, as in my other invention, the entire upper portion or head of the frame-work is formed as a vibrating box or frame bounded by the pin block in front, the back-board at the back, the outside studs at the sides, and the cover or lid at the top,—in which box exist transverse divisions formed by the upper portions of the framing studs, between which divisions and the aforesaid bounding members the tone conductors exist and extend from the open spaces to the rear of the main sounding board upward 60 as far as the cover of the instrument.

65 *c* are a series of forwardly-facing mouths to the tone conductors which open into or com-

municate with said conductors in such manner that tone emanating upward from the spaces to the rear of the sounding board through said conductors, can find vent forward through said mouths directly to the front, through the front face, so to speak, of the instrument, and into the apartment within which it is placed. These mouths can be formed as slots, cuts, perforations, recesses, or other openings, cut bodily through and out of the upper portion of the pin block, when placed in the usual manner,—or else can be formed, without actual cutting or notching out of the upper portion of the pin block, either by simply leveling off or dressing away to a sufficient depth the entire upper portion of said block, or else by lowering the pin block sufficiently to occasion the formation of these mouths between the cover and its thus, as aforesaid, lowered upper level. 75

80 *a*² is a sounding deflector, or sound board, extending, at a proper angle, from the edges of the mouths of the tone conductors to the upper rail of the upper panel frame *a*³ of the front of the casing, so that together with said upper panel frame the said deflector constitutes the entire upper portion of the outside front face of said casing. I do not confine myself to any particular angle for this deflector and it may lie in a horizontal, or almost horizontal plane and still subserve a useful purpose. It is essentially a sounding board, extending from the pin block to the upper part of the vertical front portion of the casing. 85 90 95 100

105 *a*⁴, Fig. 1, are brackets which serve as stiffening ribs to the sounding deflector, and which are introduced, wherever used, in front of a stud and therefore between adjacent mouths of the tone conductors, and below the solid cover. As many of these brackets are employed as may be desired. They present an ornamental appearance and, when used, obviate the necessity of otherwise bracing the sounding deflector. 110

115 S is a sounding dome, composed of sounding board wood, and adapted to be removably secured along its upper edge to the pin block underneath the deflector, and at its lower lateral portions to the sides of the casing. The dome, as stated, may, in the construction of a piano embodying my present improvements, be dispensed with.

120 *a*³ is, as stated, the upper panel frame of the front of the casing. *a*⁵ is the lower panel frame of said front, which lies below the key bottom. Each of these panel frames is preferably formed with continuous rails of thin wood, and with end styles but no munions. Each frame is adapted to contain a panel composed 125 entirely of a series of suitably, but preferably vertically, disposed sounding and reverberating slats, *w* and *v*.

130 The construction, application, and means for operating the slats, being the same in both panel frames, I will limit my description to the upper frame.

Within the aforesaid panel frame is contained a fixed slat frame W, which fills the

panel opening of said frame, and is rearwardly extended therefrom to a desired depth. The region of joiner between the aforesaid two frames may be ornamented by beads, chamfers, or otherwise at will.

V is a sliding slat frame conformed to snugly fit and have a telescopic, or in and out, movement of a predetermined extent within said fixed slat frame.

Each of the slat frames is provided with a series of parallel slats, w and v , spaced a given distance apart. The slats composing the series of one frame are in their mounting within their frame alternated with respect to the mounting of the slats composing the series of the other frame, so that the openings between the slats of either frame register with the slats of the other frame, and, when the sliding frame is moved or closed up within the fixed frame, the edges of the slats of the respective frames meet or lap and close the openings.

The form of the slats is not material. I prefer, however, to make them of semi-cylindrical form, the convexity of the slats of the outer frame and the concavity of the slats of the inner frame facing toward the front of the instrument.

All of the slats of both series are preferably parallel, but the general direction or trend of the slats is not important. In the drawings I show them as vertically disposed, and the slats of the respective series as semi cylinders of the same diameter and so staggered or disposed that their longitudinal edges, when the frames are closed in, are adapted to meet and abut together, the double series in such position presenting from above, or viewed sectionally as in Fig. 4, a continuous and regular serpentine line.

The slats are each made of thin material, preferably sounding board wood, so as to be thoroughly resonant.

When the sliding frame is slid in to close the openings between the slats of the respective series, the slat-composed panel shown in the drawings presents from the front the appearance of a uniformly corrugated surface composed of crests and hollows, and constitutes a sounding face to the casing.

While, as stated, I prefer the semi-cylindric form of slat, I do not confine myself to such form, and contemplate using slats which are, sectionally considered, either flat, slightly curved, angular, semi-elliptic, or semi polygonal. I do not moreover confine myself to mounting the slats within slat frames or within a panel frame strictly as such, because, while such a mounting as that which I have described is convenient, it is apparent that the invention is broad enough to cover any such application of the slats to the front face of the casing as a cabinet maker would naturally resort to.

The object of this invention, so far as the mounting and moving of the slats is concerned, being to most cheaply and readily occasion the movement of one series of slats toward and from the other series,—it is obvious that I can

resort to many constructions for securing this result, each series being, if desired, mounted in a movable frame, and the two frames being both relatively movable, or either one fixed and the other relatively movable. I prefer, however, the construction which I have represented and described and in which the inside and innermost frame moves.

Many mechanical devices operated by a pedal, a draw-stop, or a hand, knee, or elbow lever, may obviously be adapted to effectuate the movement of either or both slat frames. I find it convenient to employ a pedal and lever connection operative only upon the inner slat frame, and of the following construction:

T is a slat-pedal, being a supplemental pedal conveniently disposed between the loud and soft pedals of the action, and operating upon a horizontal first order pedal lever t , connected with a vertical pedal rod t^x suitably housed or stayed, in the form of application represented, just inside of the left side of the casing. This pedal rod rises in a plane parallel with and adjacent to the plane of the inside face of the pedal frames, and its upper extremity comes immediately beneath the horizontal arm of a vertically disposed right angular crank, which I term the rocker bell crank t^z , fulcrumed against the inside face of the upper panel frame, the vertical arm of which crank bears against a lug u^x projecting radially forward from a vertically disposed rock shaft U suitably housed or journaled, conveniently, within extended extremities w^x of the flat upper and lower rails of the fixed slat-frame. The rock shaft extends beyond both of its bearings w^x , being suitably stepped with respect thereto, and, as to its extended extremities, is fixedly equipped with two right angular bell crank levers, which I term frame cranks u' , which lie, in a horizontal plane parallel respectively with the planes of the upper and lower rails of the fixed slat-frame, immediately against the respective outside faces of said rails, and the longitudinally extending arms of which frame cranks bear against the cheek pieces v^x , or kindred abutments, connected with or being a part of the near end of the sliding slat-frame. The transversely extending arms of the frame cranks u' are, at their outer extremities, provided with links Z which extend longitudinally along the respective upper and lower rails of the fixed slat-frame, and are pivotally connected at their far extremities to the transverse members of counter frame cranks z , conveniently fulcrumed upon the aforesaid upper and lower rails of the fixed slat-frame, and engaging with their longitudinal arms counter cheek pieces v^o upon the far end of the sliding slat-frame. The duplication of the frame cranks and cheek pieces, by the connection with them, through the links, of counter frame cranks and counter cheek pieces, is simply for the purpose of equalizing thrust upon the sliding frame and preventing its binding within the fixed slat-frame.

X are a series of frame springs, being flat

5 springs respectively secured at one extremity to the inside face of the panel frame, and as to the other extremity bearing upon the back of the sliding frame. The office of these springs is to maintain the sliding frame normally within the fixed frame and the respective series of slats closed together.

Such being a preferred contrivance for occasioning the moving of the sliding slat frame, its operation will be readily understood.

Depression of the pedal is attended, through the pedal lever, with an elevation of the pedal rod, accompanied, in turn, by a right hand deflection of the rocker bell-crank, by a partial oscillation of the rock shaft, and by such a throw of the frame cranks and counter frame cranks as to occasion, by the thrust of said cranks against the cheek pieces, an inward movement of the sliding frame sufficiently strong to, for the time being, overcome the resisting stress of the frame springs. In order to conveniently operate the slats of the lower panel, I provide the pedal lever with a supplemental pedal rod t^3 , which acts upon a supplemental rocker bell-crank t^4 co-operating with a set of devices, applied to the aforesaid lower panel for occasioning the movement of its frame, entirely similar to the set above described in connection with the upper panel. In order without continued foot pressure to maintain the pedal depressed against the stress of the frame springs, and the slats in consequence open, it is convenient to provide the pedal with a spring-actuated retaining catch t^5 , Figs. 1, 7 and 8, the hooked extremity of which is by a spring t^6 , secured to the catch and acting against the face of the casing, retained in a notch a^6 in the casing, when once, by the depression of the pedal, engaged therein. Any other contrivance operative to the same purpose can, however, be substituted for the spring catch.

K is what I term a key board swell, it being a swinging board hinged near or at its base, and constituting when raised the back face or vertical rear boundary of the key board. It is a device which may be employed singly in ordinary upright pianos, or employed in a piano embodying the improvements hereinbefore recited, as a supplementary casing-opening, so to speak, serving to admit of the escape, immediately above the keys, of tone. It can be operated by any such hand lever contrivance as a piano maker would naturally employ, or, in connection with my slat device, can be operated from the pedal rod by the application of a swell lever k connected at its rear extremity with a lug k' on said pedal rod, and at its front extremity engaging against a lip k^2 extending rearwardly from the key board swell.

Normally, the keyboard swell stands vertically, but elevation of the pedal rod occasions a downward movement of the front extremity of the swell lever k , and a backward deflection of the swell from the vertical into

a horizontal position. Depression of the pedal rod, occasioning a reverse movement of the swell-lever, occasions the lifting of the swell into its normal vertical position by the impinging action of the front extremity of said swell lever upon the rear face of the swell.

Such being a description of a convenient embodiment of my improvements, it is only necessary to add that the sounding deflector serves to transmit and magnify the vibrations which it receives from the pin block, and to redeflect, deflect, and reverberate to the ears of the player and forward into the apartment the aggregate tone of its own vibrations, the vibrations of the pin block, and the vibrations from the rear of the sounding board.

The slats, when closed, transmit and magnify the vibrations of the instrument, giving forth pure tone only after the manner of a sounding board as such; and, when open, afford vent to the entire tone existing within the instrument, it being, however, augmented in volume and improved in quality by reverberating upon and from their surfaces.

I am aware that I am not the first to provide openings through the front face of a casing of a piano for the escape of tone; and also aware that openings in the front face of an upright piano have been combined with pivoted irreverberatory lids or plates for opening or closing to a greater or less extent the discharge openings, have been employed,—and to such invention broadly I lay no claim, but

What I do claim and desire to secure by Letters Patent is:

1. An upright piano, having a sounding deflector intermediate between and extending from the pin block to the front of the casing, substantially as and for the purposes set forth.

2. An upright piano, having a sounding deflector intermediate between and extending from the pin block to the front of the casing, in combination with a casing front containing or embodying a sounding board surface, substantially as and for the purposes set forth.

3. An upright piano having a sounding deflector intermediate between and extending from the pin block to the front of the casing, in combination with a casing front containing slats, substantially as set forth.

4. An upright piano having a sounding deflector intermediate between and extending from the pin block to the front of the casing, in combination with a casing front containing slats and provided with a key board swell, substantially as set forth.

5. An upright piano, the top portion or head of the frame-work of which is provided with channels or tone conductors having forward-facing mouths, in combination with a sounding deflector or sound board intermediate between and extending from the pin block to the front of the casing, and with a casing front containing slats, substantially as set forth.

6. An upright piano, the front face of the casing of which contains a panel-surface con-

sisting, essentially, of two series of alternating slats respectively disposed in parallel planes, substantially as set forth.

7. An upright piano, the front face of the casing of which contains a panel surface consisting, essentially, of two series of alternating slats respectively disposed in parallel planes, and which is provided with suitable means for occasioning the approach or recession of the respective series of slats, substantially as set forth.

8. An upright piano, the front face of the casing of which contains a panel of slats, the said panel consisting of two series of semi-cylindric, reverberating, alternating, slats lying in parallel planes, and, by series, reversely disposed in order that, when the slats of one series are brought into contact with the slats of the other series, the said slats may register edge to edge and constitute a corrugated panel surface, substantially as set forth.

9. The combination, to form the front face of the casing of an upright piano, of a panel frame, a slat frame contained within said panel frame and having a series of separated slats, and a second slat-frame, containing a corresponding series of separated slats alternately disposed with respect to the slats of the first

series, and which is movable with respect to the slat frame first referred to, in order to occasion the meeting or lapping of the edges of the slats, and thereby to provide, or to close, openings between the slats of the respective series, substantially as set forth.

10. The combination, in an upright piano, of a panel frame for its front face,—a slat frame contained within said panel frame and having a series of separated slats,—a second slat frame, containing a corresponding series of separated slats alternately disposed with respect to the slats of the first series, and which is movable with respect to the slat frame first referred to, in order to occasion the meeting or lapping of the edges of the slats, and thereby to provide, or to close, openings between the slats of the respective series,—and suitable means, under the control of the player for occasioning the relative approach or separation of the slats of the aforesaid respective series, substantially as set forth.

In testimony whereof I have hereunto signed my name this 3d day of March, 1887.

W. H. DUTTON.

In presence of—

J. BONSALE TAYLOR,

WM. C. STRAWBRIDGE.