

No. 740,514.

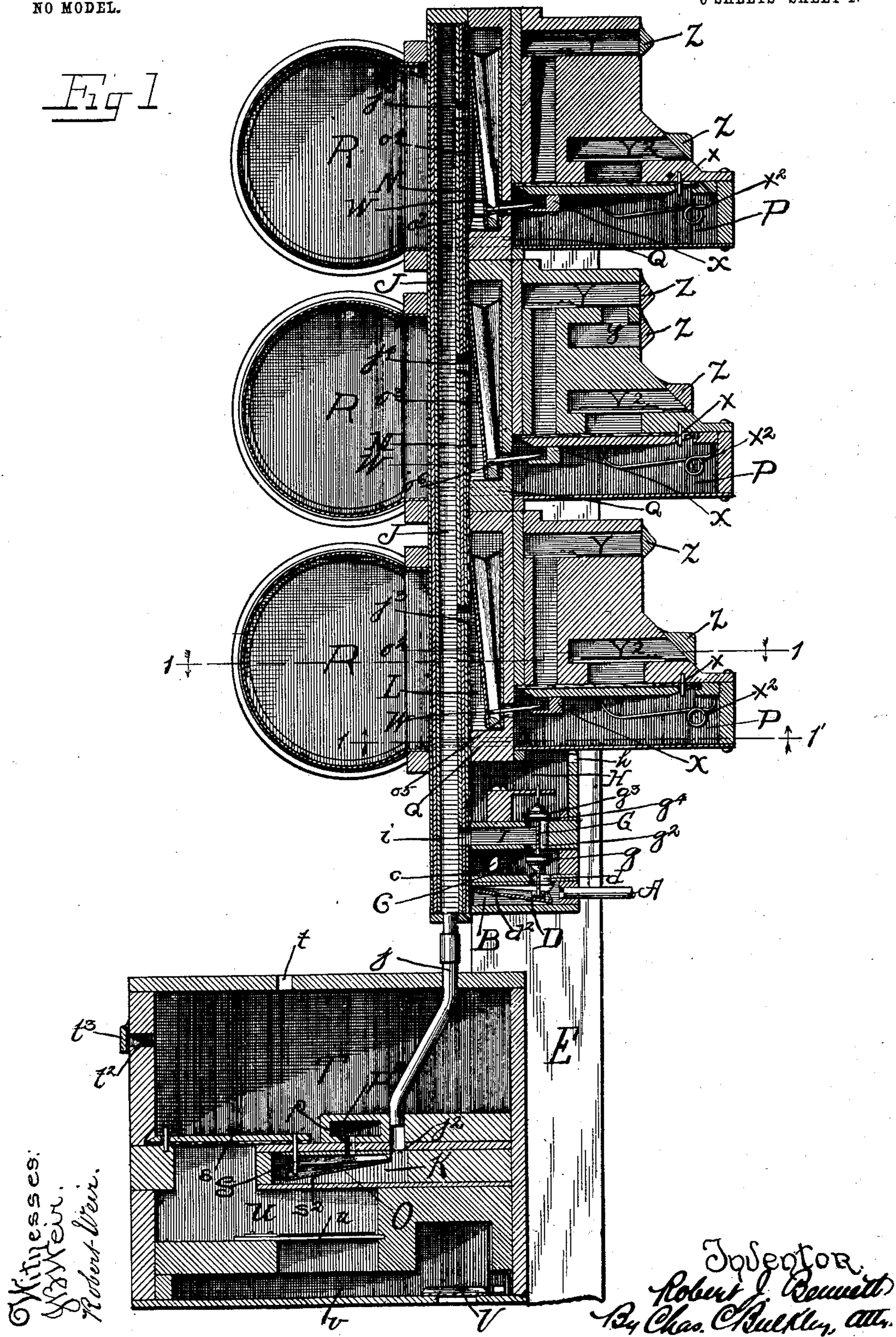
PATENTED OCT. 6, 1903.

R. J. BENNETT.  
MUSICAL INSTRUMENT.  
APPLICATION FILED FEB. 8, 1898.

NO MODEL.

6 SHEETS—SHEET 1.

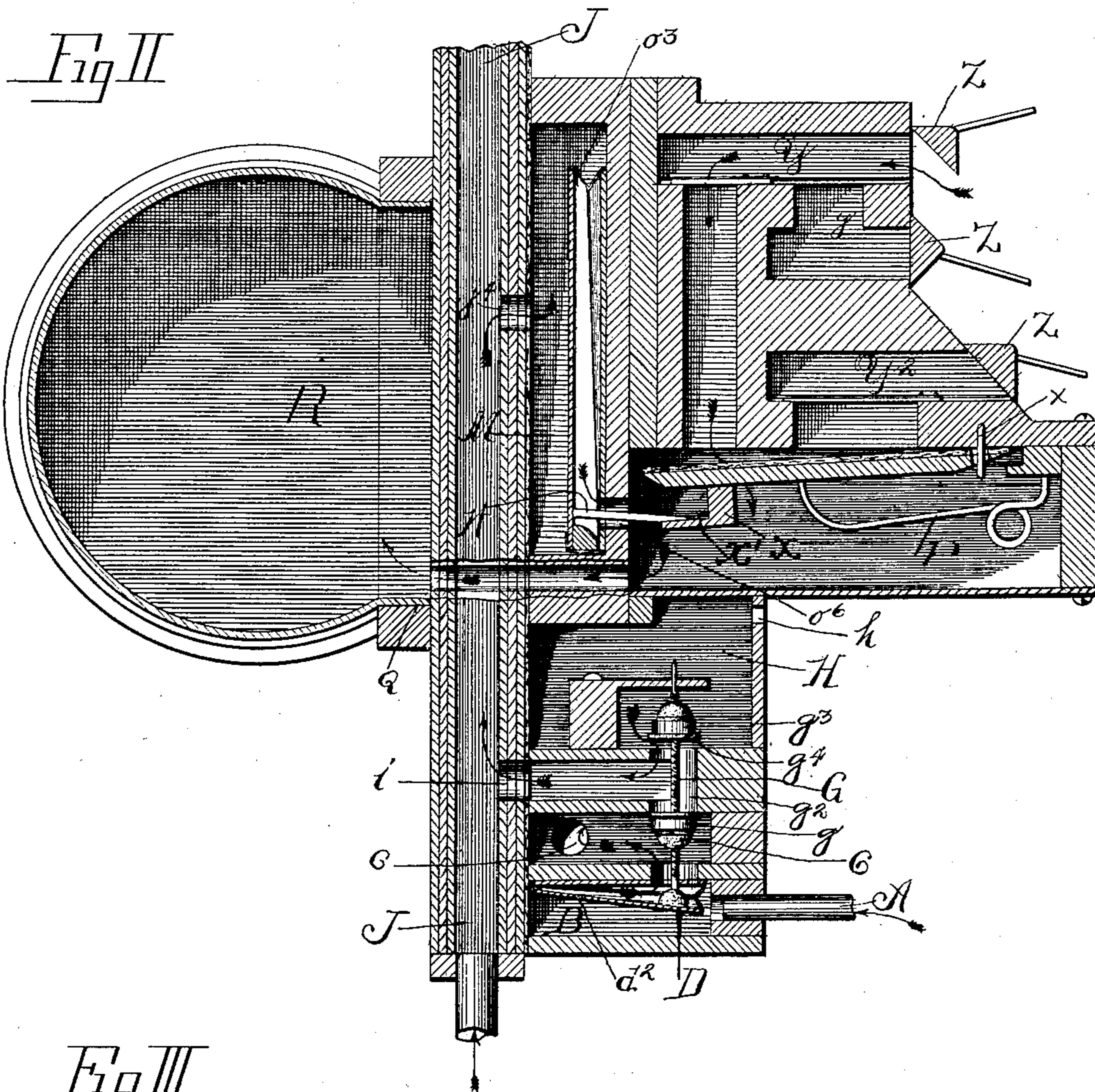
*Fig 1*



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6 SHEETS—SHEET 2.



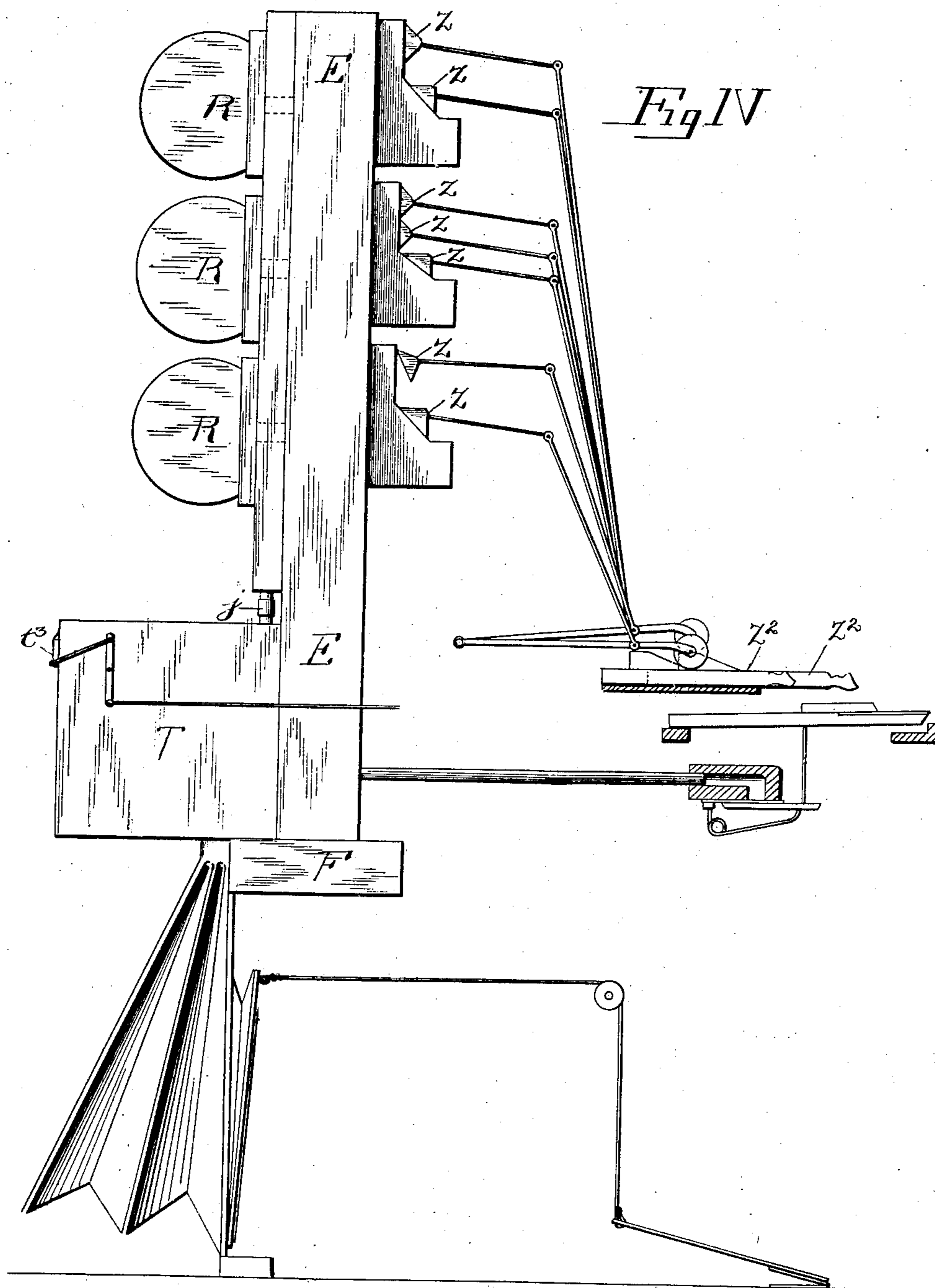
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Robert Weir

Inventor:  
Robert J. Bennett  
By Chas. Buckley, Atty.

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6 SHEETS—SHEET 3.



Witnesses.  
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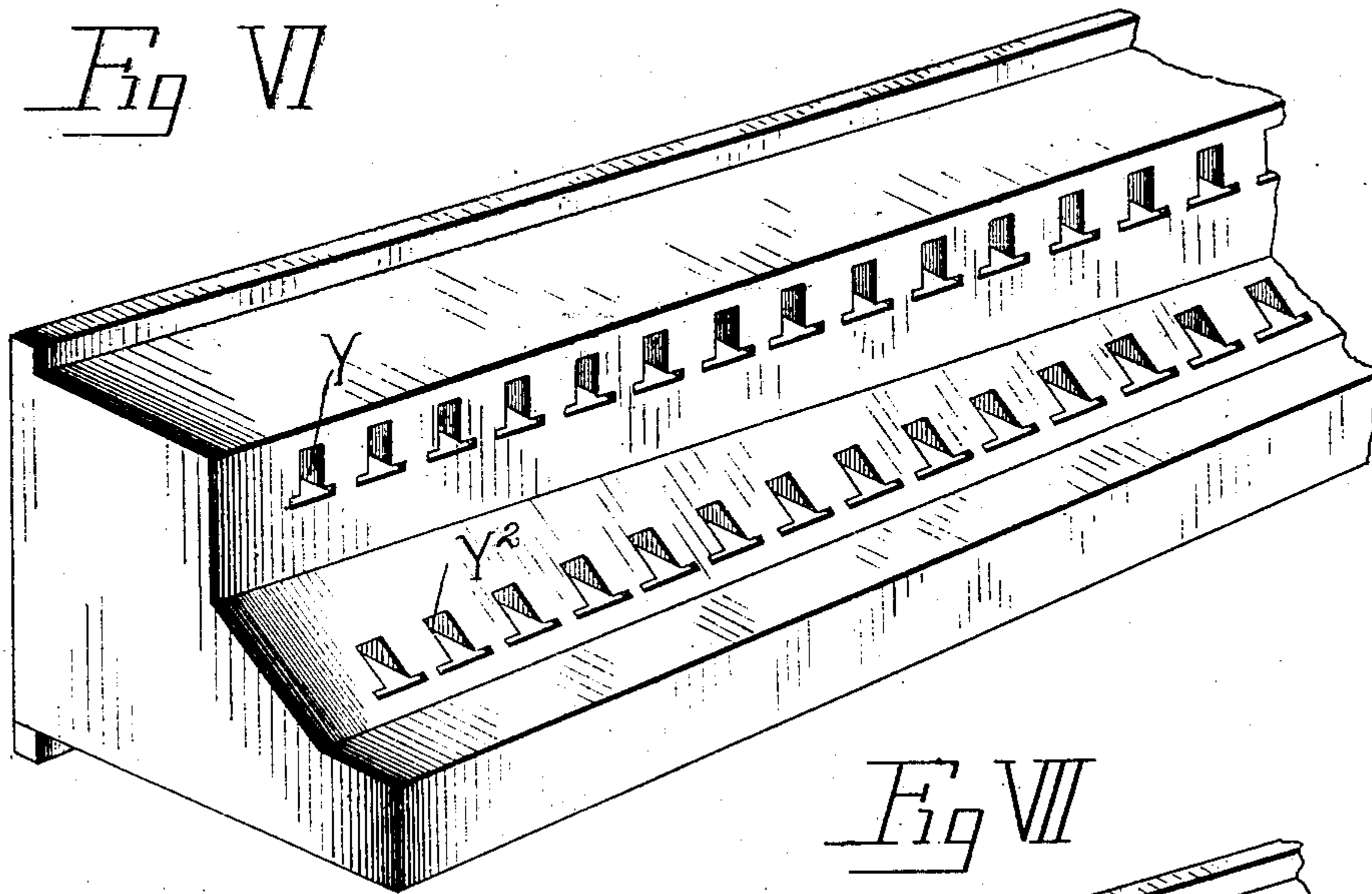


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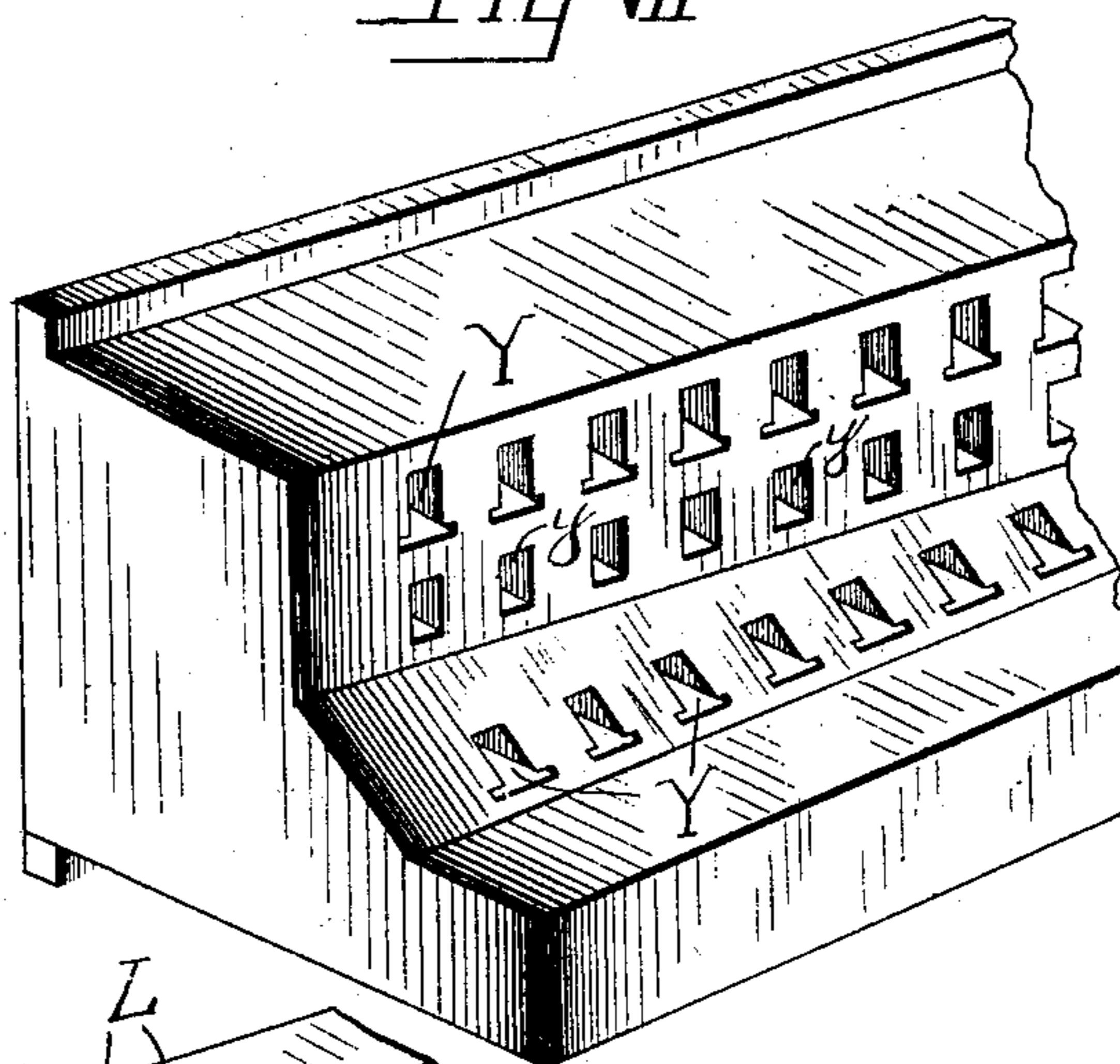
NO MODEL.

6 SHEETS—SHEET 5.

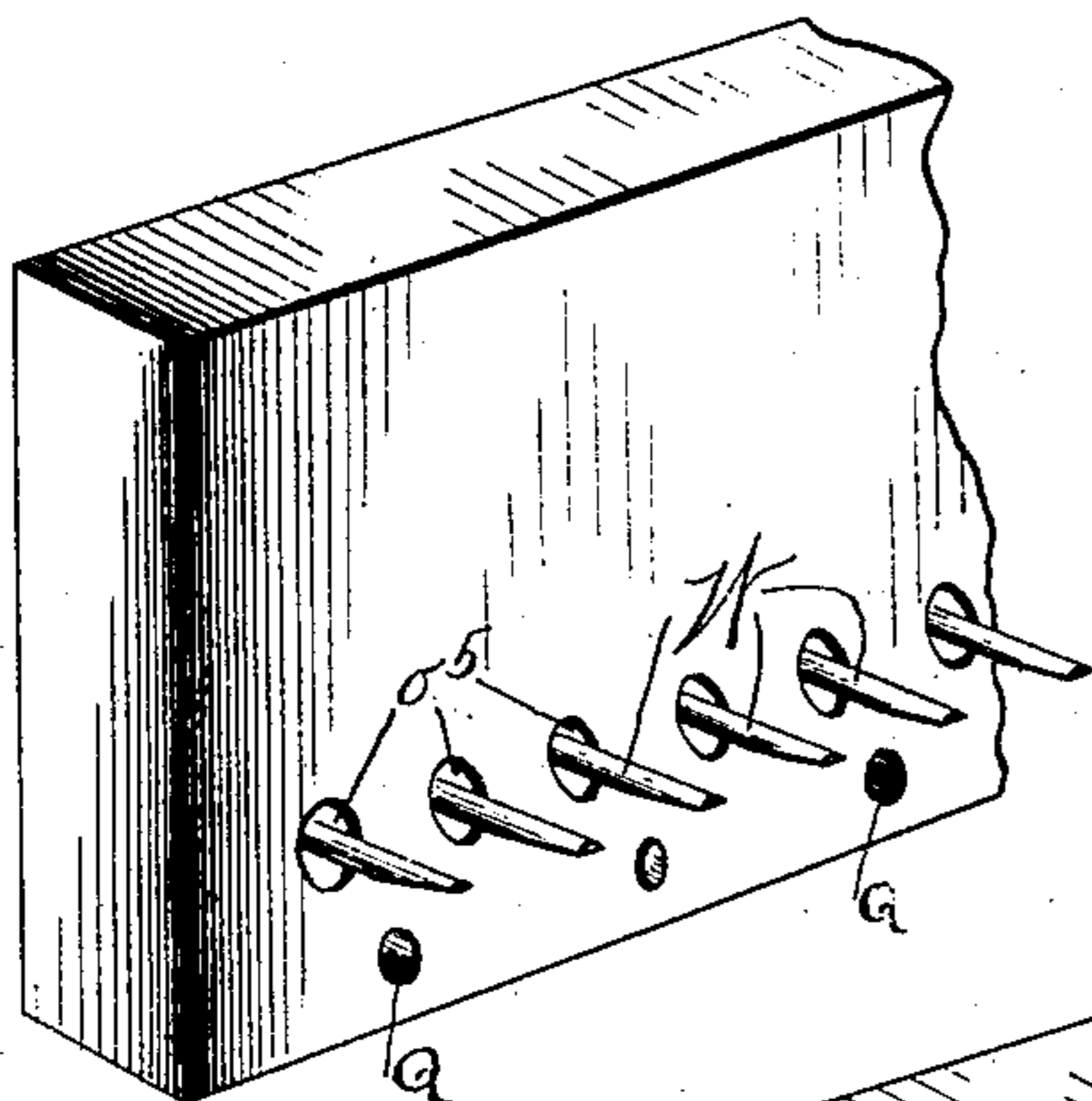
*Fig VI*



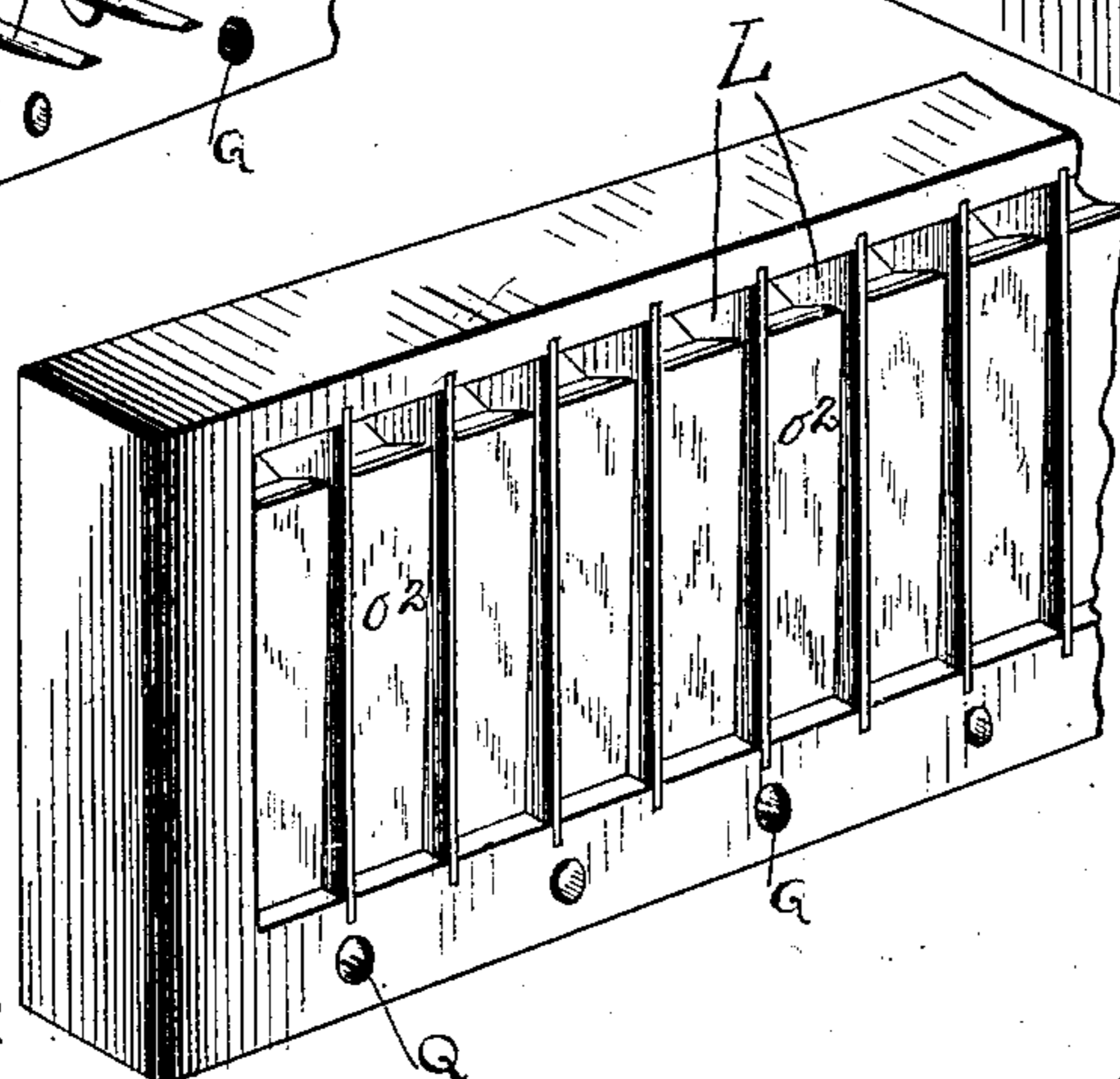
*Fig VII*



*Fig VIII*



*Fig IX*



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6 SHEETS—SHEET 6.

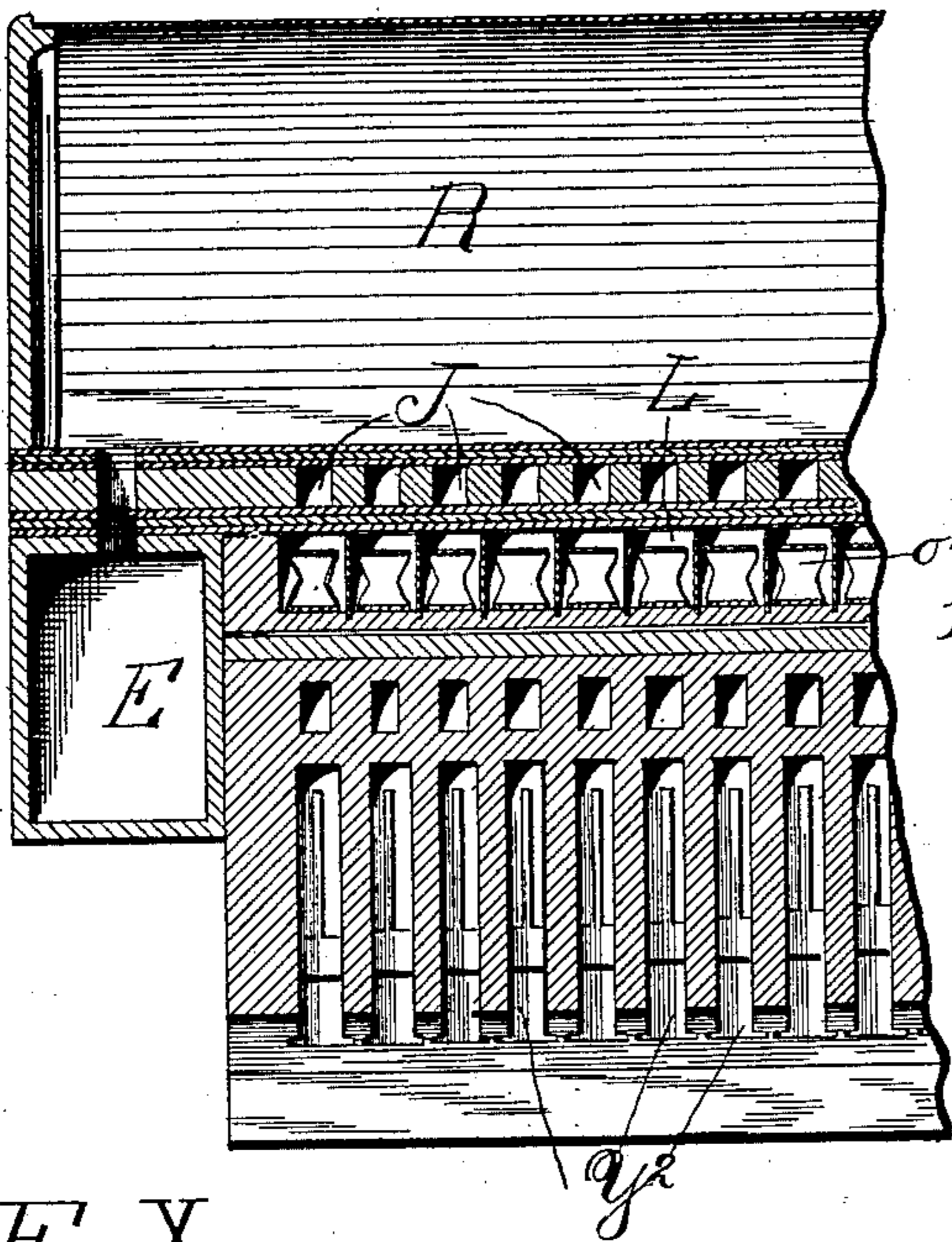


Fig X

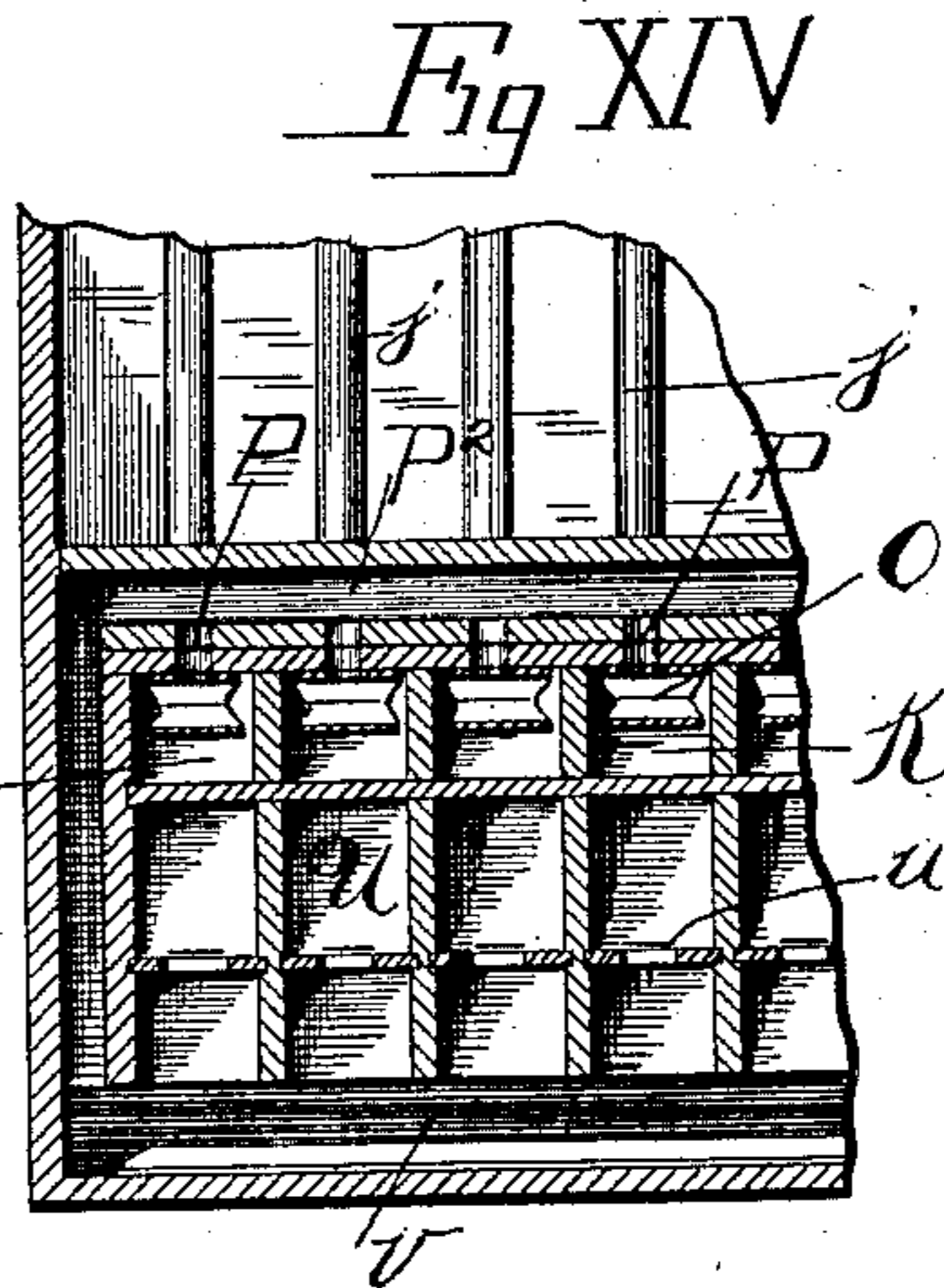


Fig XIV

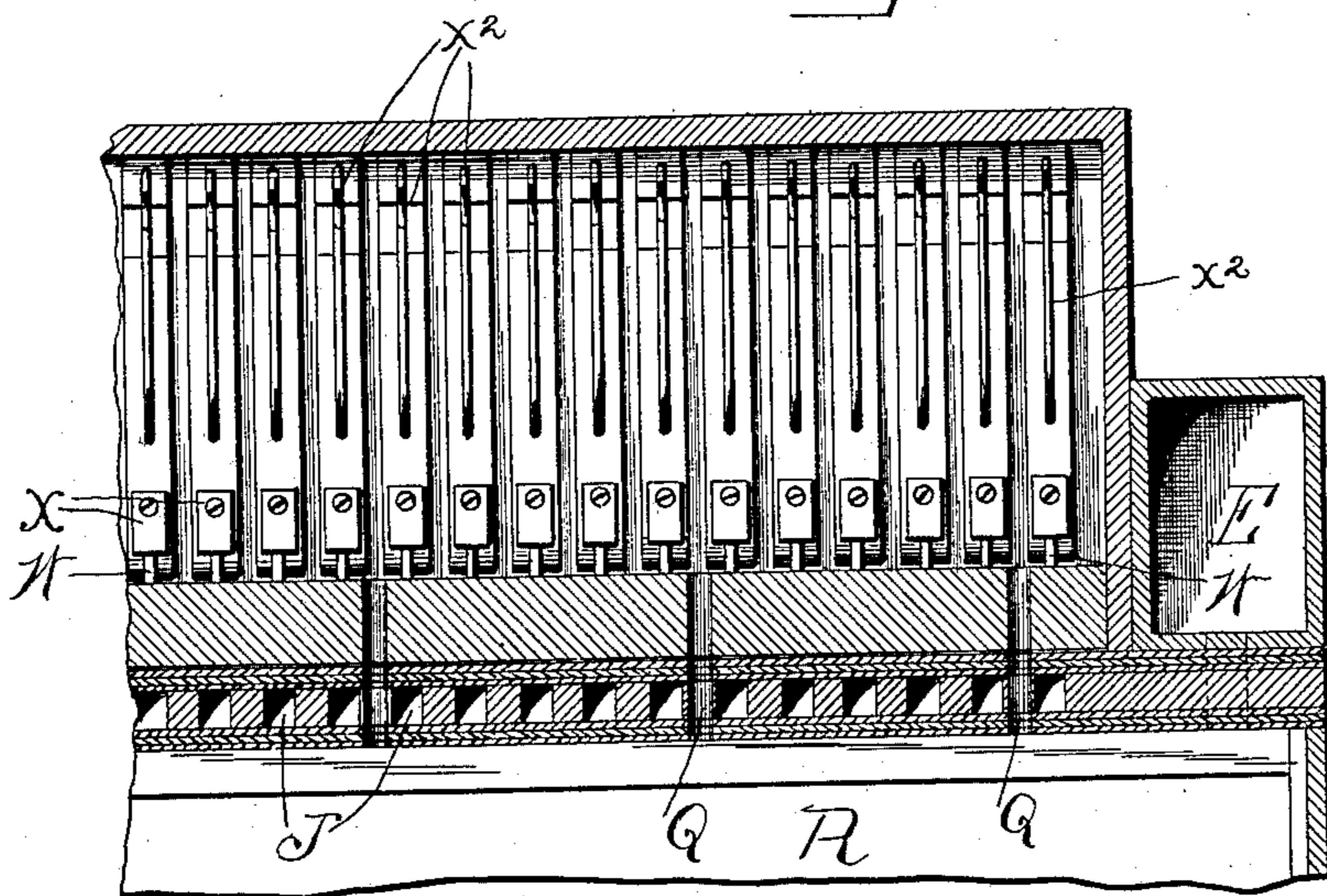


Fig XI

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## UNITED STATES PATENT OFFICE.

ROBERT J. BENNETT, OF CHICAGO, ILLINOIS, ASSIGNOR TO LYON & HEALY,  
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## MUSICAL INSTRUMENT.

SPECIFICATION forming part of Letters Patent No. 740,514, dated October 6, 1903.

Application filed February 8, 1898. Serial No. 669,606. (No model.)

*To all whom it may concern:*

Be it known that I, ROBERT J. BENNETT, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Musical Instruments, of which the following is a specification.

Referring now to the accompanying drawings, wherein like reference characters indicate the same or corresponding parts, Figure I is a vertical transverse section of a portion of the improved musical instrument of my invention with the component parts thereof shown in normal or closed position. Fig. II is a slightly-enlarged vertical transverse section of a portion of the parts shown in Fig. I and in the same plane, but which parts are herein made to appear in one of the several open positions possible to be effected by varying the combination of the parts shown, a further difference between Figs. I and II being that in Fig. II at the points indicated in both figures by the letters Q the walls of the wind-passage J and the base of the box containing the pneumatic—for example, the pneumatic  $o^3$ —are cut away to disclose the connection of the suction-chamber P with the resonator R through the air-passage Q. Fig. III is in part a plan and in part a sectional view of a portion of the detail shown in Fig. II and illustrates one manner in which communication may be established between the suction-chamber C and the wind-trunk E and between the resonator R and the wind-trunk E. Fig. IV is a side elevation of a portion of my improved musical instrument, partly shown in vertical transverse section, and illustrates one form of means that may be employed to respectively open or close the ports to the reed cells or passages, which ports are normally held closed by the mutes Z by pulling out or pushing in a stop-rod or stop-rods  $Z^2$ , by which movements the mutes referred to are respectively raised from their seats or returned thereto. Fig. V is a front elevation of a portion of the interior of the parts of the improved musical instrument of my invention shown in Fig. I broken away at the left-hand side of the middle and further broken away at the base thereof to disclose the relative location of the reed-cells Y  $y$   $Y^2$  to the

two-seat double valve G and the pneumatics D, which actuate said valves, being still further broken away at the right-hand side of the middle to illustrate the relative location of the air-passages Q and  $j^3 j^4 j^5$ , respectively, communicating with resonators R and suction-chambers P, and also the location of the ports  $i i$ . Fig. VI is a perspective view of a portion of one of the several preferred forms of reed-cell sections utilized in my improved musical instrument, showing the relative position of the reed cells or passages Y  $Y^2$ , which passages are normally closed by any desirable number or combinations of the mutes referred to in explanation of Fig. IV, but which are omitted from this figure. Fig. VII is a perspective view of a portion of another of the several preferred forms of reed-cell section, showing the relative position of the reed-cells Y  $Y^2$  to the subpassages  $y$ . Fig. VIII is a perspective view of a portion of one of the boxes, cases, or similar structures designed to receive the pneumatics  $o^2 o^3 o^4$ , as the case may be, showing the pins, levers, or cams W, which are attached to said pneumatics, projecting through their respective apertures  $o^5 o^6 o^7$ , and also showing the ports of the air-passages Q, which establish communication between the suction-chambers P and the resonators R. Fig. IX is a perspective view of the rear of the parts shown in Fig. VIII, illustrating the disposition of the pneumatics  $o^2 o^3 o^4$ , as the case may be, in their respective chambers and the rear parts of the air-passages Q, above referred to. Fig. X is a horizontal section of a portion of my improved musical instrument drawn on the line 1 1 of Fig. I and viewed in the direction indicated thereat by the arrows. Fig. XI is a horizontal section of a portion of my improved musical instrument drawn on the line 1' 1' of Fig. I and viewed in the direction indicated thereat by the arrows. Fig. XII illustrates one form of arrangement of stop-rods and levers connected thereto, whereby the valves  $t^3$  V may be operated. Fig. XIII is an enlarged detail of the two-seat double valve G. Fig. XIV is a vertical transverse section of the subbass-box, showing one manner in which the suction chamber or passage P<sup>2</sup> may be connected with the suction chamber

or passage *v*, and thus the suction from the pneumatics *O* be controlled by the valve *V*.

My invention relates to wind instruments whose sound-producing mechanism is capable of being actuated in either of the following ways—to wit, by the manipulation of keys alone or in combination with stop-rods, by a traveling music-sheet alone or in combination with stop-rods, manually or mechanically consecutively and alone or in combination with stop-rods, manually and mechanically simultaneously and alone or in combination with stop-rods; and it also relates to means whereby the tones produced by the operation of the parts of the said instrument in either of the ways mentioned will be of a superior quality and the disagreeable noises usually incident to such instruments reduced to a minimum; and it further relates to means whereby a variety of tones or combinations of tones may be produced from one and the same reed. Heretofore musical instruments operable in either of the manners referred to have been so constructed that though the fundamental tones produced therefrom have been of the necessary pitch, yet by the interruption or distortion of the overtones the general result has been the production of tones of more or less metallic, harsh, and disagreeable quality or timbre. Again, the construction has been such as in the operation of the parts of such instruments to occasion a varying amount of noise, unpleasantly interfering with the musical character of the instrument. Further, though secondary reed cells or passages have been used in connection with direct reed cells or passages to convey air to one and the same reed for the purpose of producing more than one tone or combination of tones therefrom, yet these secondary cells or passages have been so positioned in relation to their respective reeds that the effect produced has in a great measure been of a harsh unmusical character.

The object of my invention is to remedy these defects, and to that end it consists, broadly, in combining the various elements of a musical instrument, substantially as hereinafter described, whereby the tones produced therefrom in either manner heretofore referred to are of a full, rich, and mellow quality; secondly, in combining my novel pneumatics with a case or cases removable or fixed adapted to receive the same and to muffle any unpleasant noises that may be caused by the operation of said pneumatics; thirdly, in combining a reed section or block removable or fixed with one or more reed cells or passages communicating with each reed in such manner that either a single tone or one of several possible single tones or one of several possible combinations of tones may be produced.

As the device or devices for mechanically or manually controlling the transmission of air to the hereinafter-to-be-described pneumatics (which pneumatics actuate their re-

spective reeds) may be of any well-known or desired character, it is deemed unnecessary to specifically describe herein any one particular construction. I shall therefore confine my description to those features of construction and operation to which my improvement chiefly relates.

In the accompanying drawings, *A* is one of a series of intake tubes, pipes, or passages through which air is induced and transmitted to its respective chamber *B*, (either by mechanical or manual operation of the parts referred to in the preceding paragraph, but omitted from this description.) The chamber, passage, tube, pipe, or duct *C* is subject when the instrument is being operated to a continual suction occasioned by the exhaustion of the air therein contained through the pipe, tube, port, or passage *c* by means of a bellows or several bellows, and the pneumatic *D* is also subject to the same suction by the exhaustion of the air therein contained through the passage or port *d* into said passage *C*, where it mingles with the air therein and is drawn through the port *c* into the wind trunk or duct *E*, thence into the wind box, chamber, or duct *F*, and finally to the bellows and there discharged.

The collapsible pneumatic *D* is provided with an aperture or port *d*<sup>2</sup>, (smaller than the apertures in the tracker board or boards,) through which air contained in the chamber *B* may be exhausted by means of the suction above described. When, therefore, the intake-tube *A* is closed or idle, the suction upon the upper and the under side of the base of the pneumatic *D* is equalized and the pneumatic remains in its normal or distended position. When, however, the intake-tube *A* admits air to the chamber *B*, as the influx is greater than the exhaust through the port *d*<sup>2</sup> the atmospheric pressure exerted from beneath the base of the collapsible pneumatic *D* raises the base thereof, thereby collapsing the pneumatic upward. When the supply of air from the intake-tube *A* is cut off, the pneumatic by means of its own gravity resumes its normal or distended position.

*G* is a two-seat double valve, the stem of which at its lower end connects through part *d* with the movable side of pneumatic *D* and rises therefrom through the vertically-overlying ports *g*<sup>2</sup> and *g*<sup>4</sup>, which connect the air-passage *I* respectively with the suction-chamber *C* and the muffling-box *H*, the valve-seats on said stem being so disposed as to coact with these latter two ports. When the pneumatic *D* is collapsed, it raises the two-seat double valve *G*, simultaneously closing the port *g*<sup>2</sup> and opening the port *g*<sup>4</sup>, the parts described assuming the relation shown in Fig. II. In this position of the two-seat double valve *G* air is admitted from the muffling-box *H* to the tube or passage *I* through the port *g*<sup>4</sup>. Said muffling-box is provided with one or more apertures *h*, which communicate directly with the atmosphere, but are made

sufficiently small to prevent the egress of the slight noise occasioned by the operation of the two-seat double valve G. The air thus admitted to the passage I enters through the port  $i$  into the tube or passage J, and thence a portion of it passes through the pipe or passage  $j$  to the chamber K through the port  $j^2$ , and the remaining portion passes through the ports  $j^3 j^4 j^5$  to the respective chambers L M N. While these chambers are thus filled with air, the air contained in the pneumatics  $o^2 o^3 o^4$  is continually exhausted through the respective ports  $o^5 o^6 o^7$  into the chamber P, whence it is exhausted by the bellows which draws it or draw it through the passages Q into the resonator or resonators R, and thence into and through the wind-trunk E and the wind-box F, (see Figs. II, III, and IV,) while the air contained in the pneumatic O is exhausted through the port  $p$  into the passage P<sup>2</sup> and conveyed to the wind-trunk E, thence into wind-box, and finally discharged from the bellows. By thus collapsing the pneumatic O said pneumatic raises the pin S and the valve or pallets. The air from the chamber T now passes into the reed box or cell U, and thence through the reed  $u$  into the passage  $v$ , whence it is exhausted by the bellows when the valve  $v$  is open, thereby producing a tone. These pneumatics O are gravity-pneumatics and being provided with small apertures  $s^2$  are opened or distended in the same manner as are the pneumatics D when the influx of air to the chamber K is cut off by the closing of the valve  $g^4$ . Air is supplied to the chamber T by means of a continuously open port or passage  $t$  and a port or ports  $t^2$ , controlled by a valve or valves  $t^3$ . The valves V and  $t^3$  may be controlled by a stop-rod or stop-rods adapted to open them simultaneously or to open valve V alone. (See Fig. XII.) Opening the port  $t^2$ , which directly communicates with the atmosphere, causes a greater influx of air to the chamber T, thereby producing a tone of greater volume than that produced when the intake-port  $t$  is used alone.

The operation of the several series of pneumatics  $o^2 o^3 o^4$  may be adequately explained by a description of the operation of any one of the same—for example, one of the series of pneumatics  $o^3$ . The inner ends of the suction-chambers P abut against the lower ends of the pneumatic-inclosing chambers L M N, &c., and the resonating passages from the reed-cells Y open into said suction-chambers overhead adjacent to this point and the passages from the reed-cells Y<sup>2</sup> open therein somewhat farther to the front. Pallets X are hinged inside of the chambers P at the overhead point  $x$  near the outer ends thereof, with their free ends reaching nearly to the partition separating the suction-chamber from the adjacent pneumatic-inclosing chamber L, M, or N and are pressed upward by springs  $x^2$  to normally close the resonating passages. The pneumatics  $o^2 o^3$ , &c., are arranged in their respective inclosing cham-

bers with apex downward and extending below the plane of the corresponding pallet X. That side of each pneumatic adjacent to the suction-chamber P may be considered stationary or fixed and the side away therefrom as movable. A port or passage  $o^5 o^6$ , &c., opens from the pneumatic through the fixed side and near the apex into the suction-chamber slightly beneath the free end of the pallet therein, and a finger or pin W, rigidly secured to the movable side of the pneumatic opposite the port, projects through said port and engages the pallet, as by a yoke on the end of the latter, as shown. Owing to its position near the apex of a hinged leaf or side of the pneumatic, with which leaf it moves rigidly, this finger will act with all the leverage of said leaf upon the pallet when the pneumatic is collapsed to open the latter. Its movement thereagainst will resemble that of a cam, and, in fact, it will have a cam action, for which reason it is indicated in Fig. VIII as beveled on the under side of the contacting end, and is hereinafter termed a "cam." The opening of the pallet X by the collapse of the pneumatic and cam action of the finger W results in the opening of the resonating passages leading to the reed cells or passages Y Y<sup>2</sup> and the subpassages, (if the latter be present in the reed-section operated,) and by raising a mute air is admitted to a passage thus opened and the reed controlled by said mute is sounded. The beveled pin W is termed a "cam," for the reason that it has a cam-like or sliding engagement with the foot  $x'$  on the pallet. In other words, these two members, which have a sliding contact with each other, constitute engaging cam members for effecting the opening and closing of the valve. In this way the power-pneumatic is enabled to more easily and quickly open the valve, and, in addition, the spring of the valve is rendered capable of more easily and quickly closing the valve and returning the pneumatic to its normal position. This it will be readily understood is for the reason that a sliding or cam-like engagement is more powerful than a positive connection and a direct thrust. Any one or all of any set or sets of reeds may be sounded simultaneously or consecutively in the manner described by raising the corresponding mute or mutes by means of any suitable device. When the influx of air to the chambers L M N is cut off by the closing of the port  $g^4$ , the springs  $x^2$  raise their respective valves or pallets X, which in turn distend their respective pneumatics by means of their respective pins or cams W. As the closing of port  $g^4$  is attended with the opening of port  $g^2$ , the air in chambers L M N, &c., will at this moment be exhausted through ports  $j^3$ , &c., passage J, port  $i$ , passage I, port  $g^2$ , chamber C, and port  $c$ , thus relieving the pneumatics  $o^2 o^3$ , &c., from eternal pressure and facilitating their distension and inflation with air from

chambers P before the pallets X are entirely closed. There will also be suction in the chamber K at this time sufficient to insure the distension of pneumatic O therein.

5 The pneumatics  $O o^2 o^3 o^4$  being connected with the passages J  $j$  act approximately in unison; but the sounding of any particular reed or reeds depends upon the raising of the particular mute or otherwise opening the particular passage governing the influx of air to  
10 the said reed or reeds.

Referring to the enlarged detail of my improved two-seat double valve G, (see Fig. XIII,) 8 is a threaded rod or pin; 9, a leather  
15 nut; 10, a spongy substance, such as undressed kid; 11, a hard substance, such as wood; 12, a kid or other suitable valve-facing. The parts 9 10 11 12 in each valve operated by the rod 8 are respectively glued together. 13 is a leather button; 14, a spongy  
20 substance similar to that described above. 13 and 14 are glued together. The upper and lower valves may be positioned at any desired point on the pin 8 by means of the nuts 10, thus controlling the length of movement of the base of the pneumatic D and assuring a perfectly air-tight closing of the port  $g^2$  or  
25  $g^4$  when its respective valve is seated thereover, a sufficiently-large aperture being made at the points 15 to give the pin 8 freedom to slightly incline in such direction as may be caused by the upward or downward movement of the base of the pneumatic D. When  
30 the pin or the base of the pneumatic shall incline, the springy substance will conform to such inclination, thus counteracting the same. It is not to be understood, however, that for the purpose of the broad claims herein contained I confine myself to this or to any  
35 particular construction of the two-seat double valve G or of any other details of the structure.

Referring to Fig. II of the accompanying drawings, it will be seen that below the plane  
45 of the reed, situated in the cell or passage Y, but connected to such passage, is a secondary or sub passage  $y$ , which is controlled by a separate mute. This subpassage, it will be observed, opens into the direct passage Y in  
50 advance of the reed, so that the currents in both are directed to the same side of the reed. Repeated experiments attended by considerable expense have taught me that the secondary passages produce a defective tone if  
55 located above the plane of the reed and that superior tones can be obtained by locating the secondary passages below the said plane. Opening the upper passage Y alone produces one tone from the reed contained therein,  
60 while opening the subpassage  $y$  alone produces the same fundamental tone, but of a vastly different quality, occasioned by the difference between the overtones of the same fundamental tone. A third difference in  
65 quality of tone is obtained by opening both the mute to the upper and the mute to the

sub passage. This is due to a mingling of the two qualities of overtones.

By varying the size and shape of the sub-passages (for more than one may be employed 70 in connection with a single reed) different qualities of overtones are obtained just as varying mouths emitting tones singly or simultaneously produce varying qualities of overtones, though each should produce a fun- 75 damental of the same pitch.

I do not mean to confine myself to the use of any particular number of subpassages nor to limit their use to one particular set or series of reeds. Again, I do not mean to limit 80 myself to any particular size of the parts of my invention as herein described, and where I have used a descriptive word in a singular sense if the function of that particular part can as well be accomplished by the substitu- 85 tion of a number of similar parts, or, vice versa, where I have used such a word in the plural sense, while the same result might be obtained through the employment of but one of such parts, it is to be understood that my 90 invention is deemed to cover both constructions.

The remarks above being borne in mind a few details may be given respecting a preferred construction of some of the parts of 95 the instrument to which my improvement relates. The resonators R extend the entire length of the instrument. The suction-chambers P and C and the muffling-box H extend the entire length of the reed-sections. The 100 chamber T and the suction-chamber  $v$ , respectively, extend the entire length of the sub-bass reed-cells and the subbass-box. There are as many channels J, chambers L M N, pneumatics  $o^2 o^3 o^4$ , reeds, and passages Y  $Y^2$  105 as there are keys, as many subpassages  $y$  as desired, and as many channels  $j$ , chambers K pneumatics O of the subbass as there are reeds therein.

Having thus described the principle of my 110 invention and one way in which it may be carried into practice, what I claim as new, and desire to secure by Letters Patent, is—

1. A musical instrument comprising a passage communicating alternately with the ex- 115 ternal air, a suction-chamber into which said passage opens, a spring-pressed pallet normally closing the entrance into said chamber, a collapsible pneumatic communicating with said suction-chamber, a cam device 120 serving as connection between the pallet and the movable side of said pneumatic, whereby said pallet is easily opened when the pneumatic is collapsed and the said pneumatic easily distended when the pallet closes, a 125 chamber in which said pneumatic is confined, means whereby said chamber is alternately subjected to air-pressure and relieved therefrom, so as to cause the pneumatic to open and close said pallet, and means for exhaust- 130 ing the air from said pneumatic.

2. A musical instrument comprising a reed

cell or cells, an air passage or passages leading therefrom, a suction-chamber into which said passage opens, a spring-pressed swinging pallet normally closing said passage, a collapsible pneumatic communicating with said suction-chamber, a sliding connection between the movable side of said pneumatic and the pallet comprising engaging cam members, a member being carried each by the movable side of the pneumatic and the pallet, whereby said pallet is opened when the pneumatic is collapsed and said pneumatic distended when the pallet closes, a chamber in which said pneumatic is confined, and means whereby said chamber is alternately subjected to air-pressure and relieved therefrom, so as to cause the pneumatic to open and close said pallet, and means for exhausting the air from said pneumatic.

3. A musical instrument comprising a pneumatic, a suction-chamber into which it directly opens, a reed or reeds, a passage or passages from said reed or reeds to said suction-chamber, a spring-borne pallet associated with and arranged at an angle to said pneumatic, said pallet normally closing the entrance of said passage into the suction-chamber, relatively sliding connecting parts between said pallet and the pneumatic, the pneumatic carrying one part and the pallet another, whereby the collapse of the pneumatic easily opens the pallet and the closing of the pallet easily distends the pneumatic, and exhaust devices adapted to normally communicate with both the exterior and the interior of each pneumatic, and means whereby the exterior of each pneumatic may be subjected to air-pressure while its interior is maintained in communication with said exhaust devices.

4. In a musical instrument, the combination of a reed cell or cells, an air passage, or passages, leading therefrom, a suction-chamber into which said passage opens, a spring-pressed pallet normally closing said passage, a collapsible pneumatic communicating with said suction-chamber, a connection between the movable side of said pneumatic and the pallet whereby said pallet is opened when the pneumatic is collapsed and said pneumatic distended when the pallet closes, a chamber in which said pneumatic is confined, an air-passage leading to said chamber, a muffling-box opening to the external air, a suction-chamber under continuous exhaust, ports to ultimately connect said air-passage on one side to the muffling-box, and on the other side to the suction-chamber under continuous exhaust, a double seat valve for alternately opening one of said ports and closing the other, and means for operating said valve.

5. In a musical instrument the combination of a passage communicating ultimately with the external air, a suction-chamber into which said air-passage opens a spring-borne horizontal pallet normally closing the inlet of said passage into the suction-chamber, an ad-

joining compartment closed off from said suction-chamber, an air-passage into which said compartment opens independently, means for alternately exhausting and supplying air-pressure to said latter passage, a vertical pneumatic secured to that wall of said compartment dividing it from said suction-chamber, a port opening from said pneumatic into the suction-chamber, and a cam or finger secured to the movable side of the pneumatic and extending through said port into engagement with the free end of said horizontal pallet.

6. In a musical instrument the combination, for the purpose of alternately admitting and exhausting air from compartments therein, of an exhaust-passage under continual suction, an air-passage on one side thereof, leading into the instrument, a muffling-box beyond the air-passage, connected with the external air by relatively small apertures, an air-chamber on the reverse side of the exhaust-passage, an air-intake adapted for intermittent closure, leading into said air-chamber, a pneumatic within said air-chamber and connected to the partition between it and the exhaust air-passage, a port opening from said pneumatic into the exhaust air-passage, a relatively diminished port opening from said pneumatic into the air-chamber, and a double-seated valve worked by said pneumatic and operating to open the air-passage to the muffling-box and close it to the exhaust-passage when the pneumatic is collapsed, and to close it to the muffling-box and open it to the exhaust-passage when the pneumatic is expanded.

7. In a musical instrument the combination of an air-chamber, an air-intake leading thereto, a superposed exhaust-passage under continual suction, an air-passage above the exhaust-passage, a muffling-chamber above the air-passage, a pneumatic in the air-chamber, ports vertically above one another leading from the pneumatic into the exhaust-passage, from the exhaust-passage into the air-passage, and from the air-passage into the muffling-chamber, a relatively reduced port leading from the pneumatic into the air-chamber, a valve-stem passing through said first-named ports and connecting with the movable side of the pneumatic, and valve-seats thereon acting to alternately close one of the ports opening into the air-passage and open the other with the collapse and expansion of the pneumatic.

8. In a musical instrument the combination of the following elements, viz: a supply-pipe A; chamber B; pneumatic D, having ports  $d$ ,  $d^2$ ; suction-chamber C, having ports  $c$ ,  $g^2$ ; passage I, having ports  $i$ ,  $g^4$ ; two-seat double valve G, adapted to simultaneously admit air to the chamber I through the port  $g^4$  and cut off the suction from the chamber C through the port  $g^2$ , when the two valves of said two-seat double valve are elevated by the pneumatic D, and, when they are lowered by said

pneumatic, to close the port  $g^4$  and open the port  $g^2$ , substantially as described.

9. In a musical instrument, the combination of an upright collapsible pneumatic, a suction-chamber near the apex thereof, a port through the fixed side of the pneumatic into the suction-chamber adjacent to said apex, a passage opening into the suction-chamber near said port, a spring-borne horizontal pallet normally closing said passage and having its free end adjacent to said port, and a finger attached to the movable side of the pneumatic and projecting through said port into engagement with the free end of said pallet, whereby said finger acts as a cam or lever upon the pallet, to open it as the pneumatic collapses, and is in turn acted upon by the pallet to distend said pneumatic.

10. In a musical instrument, the combination of a reed cell or cells, a passage leading therefrom, an exhaust-chamber under constant suction into which said passage opens, a spring-borne pallet normally closing said passage, an upright collapsible pneumatic opening near its apex into said exhaust-chamber, and connected with said pallet to open it when collapsing and be expanded by it when said pallet closes, a compartment inclosing said pneumatic, a resonator connected to said exhaust-chamber, and an exhaust-trunk to which said resonator is also connected, an air-passage connected to the pneumatic-inclosing compartment, a muffling-box on one side of said air-passage an exhaust-passage under continuous suction on the other side thereof, and a double-seated valve adapted to connect the air-passage alternately with the muffling-box and with the exhaust-passage.

11. In a musical instrument the combination of a series of upright pneumatics, contained in a case adapted to receive and separate them one from another, each chamber of said case being provided with a port through which a finger attached to the hinged portion of the pneumatic contained in said chamber projects, and a port or ports through which air is admitted about the exterior of the pneumatic, and means whereby air is conducted by separate passages to each individual chamber, and a series of horizontally-hinged pallets closing passages from reed-cells, and engaging with said fingers at their free ends, substantially as described.

12. In a musical instrument, the combination of two or more tiers or banks of series of upright collapsible pneumatics, each pneumatic of each series being separated from every other pneumatic of the same series; an independent compartment inclosing each pneumatic as many distinct and hermetically-separate air passages or channels as there are pneumatics of the larger or largest series of pneumatics, each of which channels communicates only with one of the pneumatic-containing compartments of the larger or largest series of pneumatics and the compart-

ment of each of the other series which is in approximate vertical line with said pneumatic of the larger or largest series; and intake tubes or passages A, pneumatic D, suction chamber or chambers C, two-seat double valves G, muffling-box H, and passages I, substantially as described.

13. In a musical instrument, the combination of two or more tiers or banks of series of upright collapsible pneumatics and one or more tiers of series of subbass pneumatics, an independent compartment inclosing each pneumatic of each series and separating it from every other pneumatic of the same series; as many distinct and hermetically-separate air passages or channels as there are pneumatics of the larger or largest series of pneumatics, each of which channels communicates only with one of the pneumatic-inclosing compartments of the larger or largest series of pneumatics and the pneumatic-inclosing compartment of each of the other series which is in approximate vertical line with said pneumatic-compartment of the larger or largest series; and the intake tubes or passages A, pneumatics D, suction chamber or chambers C, two-seat double valves G, muffling-box H and passages I, substantially as described.

14. In a musical instrument the combination of a reed having a direct air-passage thereto, and a sub passage or passages located below the plane of the reed and communicating with the overhead direct passage in advance of the reed.

15. In a musical instrument, the combination of a reed having a direct air-passage thereto, one or more subpassages located below the plane of said reed and communicating with the overhead direct passage in advance of the reed, and means whereby air entering said passage or passages may be drawn through the reed from one and the same side thereof.

16. In a musical instrument the combination of a reed having a direct air-passage thereto, one or more subpassages located below the plane of the reed and communicating with the overhead direct passage in advance of the reed and means whereby air may be induced into or excluded from any one or more of said passages.

17. In a musical instrument, the combination of a reed having a direct air-passage thereto, one or more subpassages located below the plane of the reed and communicating with the overhead direct passage in advance of the reed, and means suitably actuated to control the admission of air to said passages, consecutively, simultaneously, or in combination.

18. In a musical instrument, the combination of a subbass-box having a valve between its air-chamber T and a suction chamber or passage, wind-box or bellows, an open port connecting said air-chamber with the external atmosphere, and a valved port also con-

necting said air-chamber with the external atmosphere.

19. In a musical instrument, the combination of a subbass-box having a valve between  
5 its air-chamber T and a suction chamber or passage, a reed between said valve and passage, an open port connecting said air-chamber with the atmosphere, and a valved port  
10 also connecting said air-chamber with the atmosphere.

20. In a musical instrument the combination of a subbass-box having the open port  
t, and valves V,  $t^3$ ; and means whereby said  
15 valves may be operated simultaneously or the valves V be operated alone, substantially as described.

21. In a musical instrument, the combination of a subbass-box having the open port  
t, and valves V,  $t^3$ ; and a stop-rod or stop-  
rods and levers adapted to simultaneously  
20 control said valves, substantially as described.

22. In a musical instrument, the combination of a subbass-box having an open port  
t, and the valves V,  $t^3$ ; and a stop-rod and  
25 levers adapted to control valve V, substantially as described.

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

ROBERT J. BENNETT.

Witnesses:

CHAS. C. BULKLEY,  
ROBERT WEIR.