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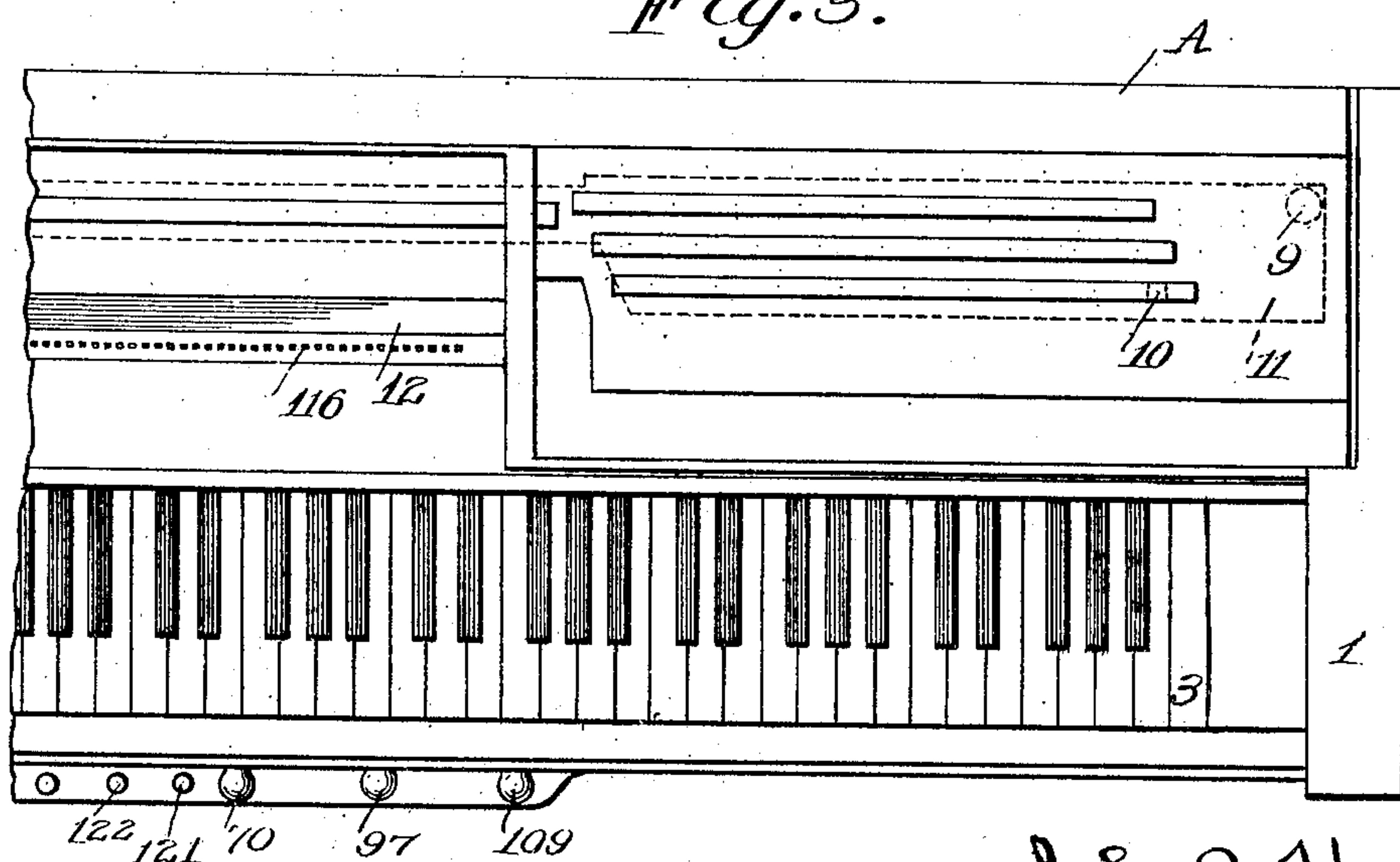
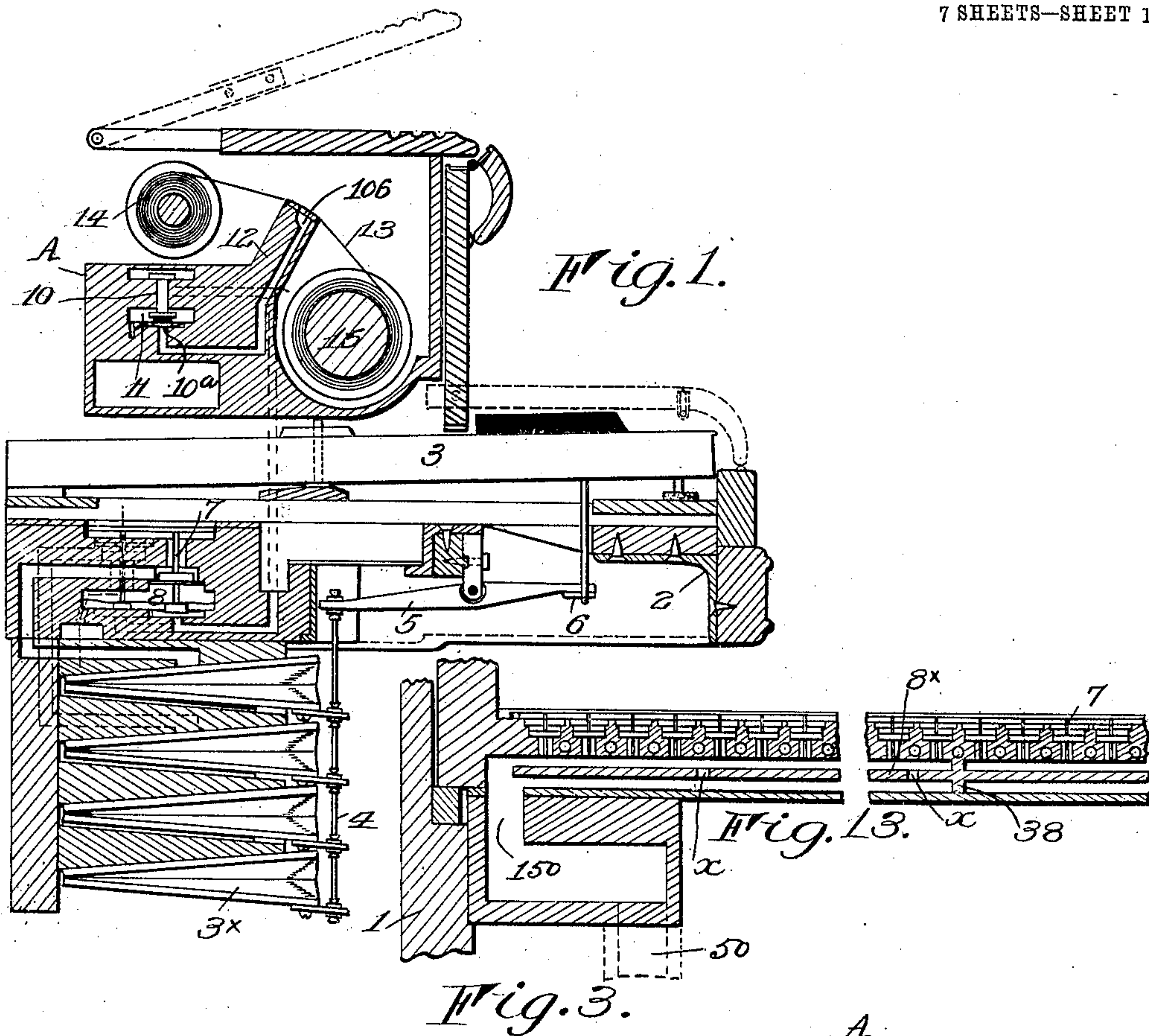
PATENTED APR. 16, 1907.

J. J. HEALY.

PNEUMATICALLY OPERATED MUSICAL INSTRUMENT.

APPLICATION FILED DEC. 9, 1904.

7 SHEETS—SHEET 1.



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7 SHEETS—SHEET 2.

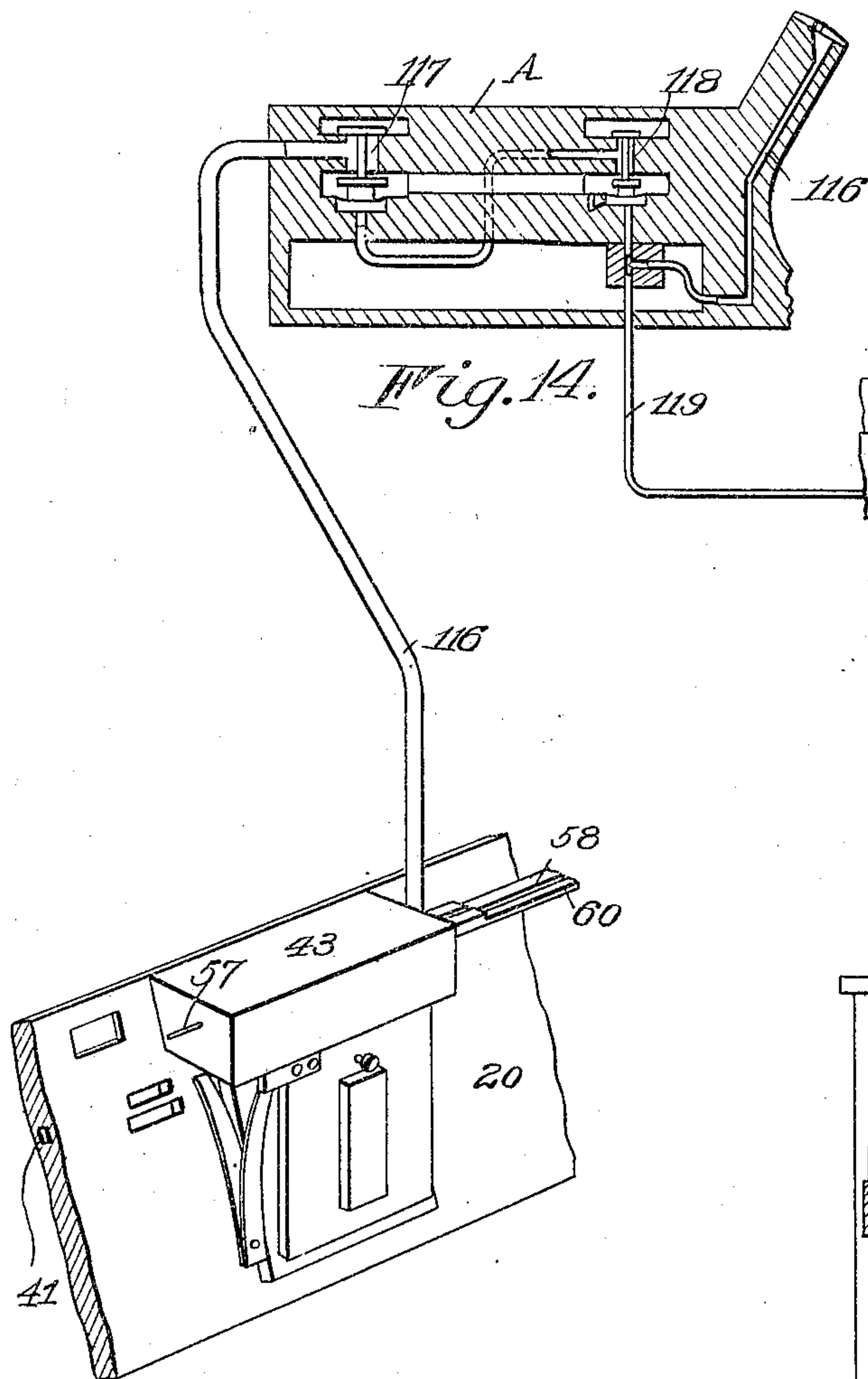


Fig. 14.

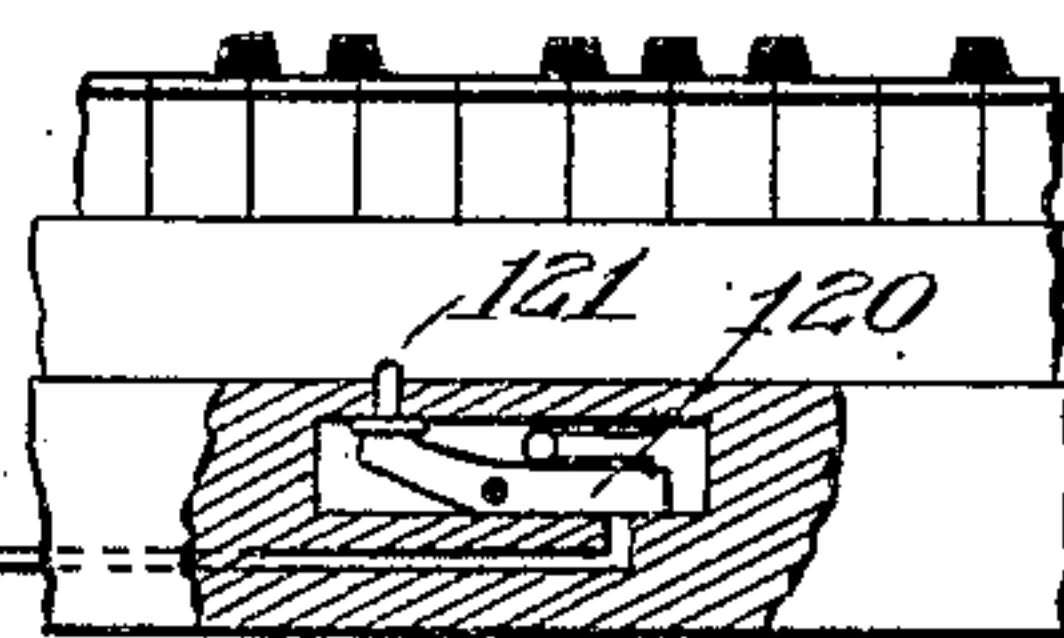


Fig. 2.

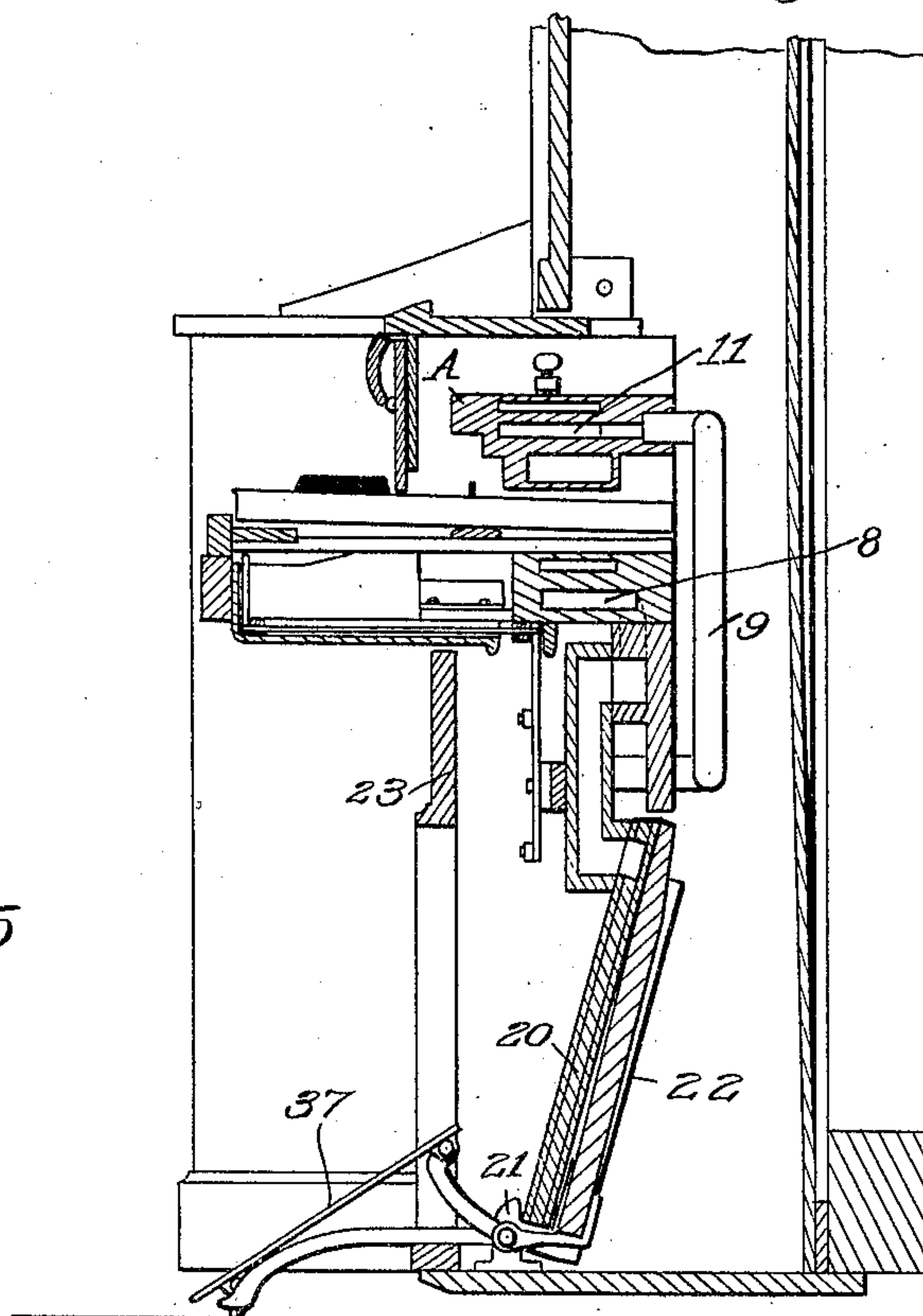


Fig. 15.

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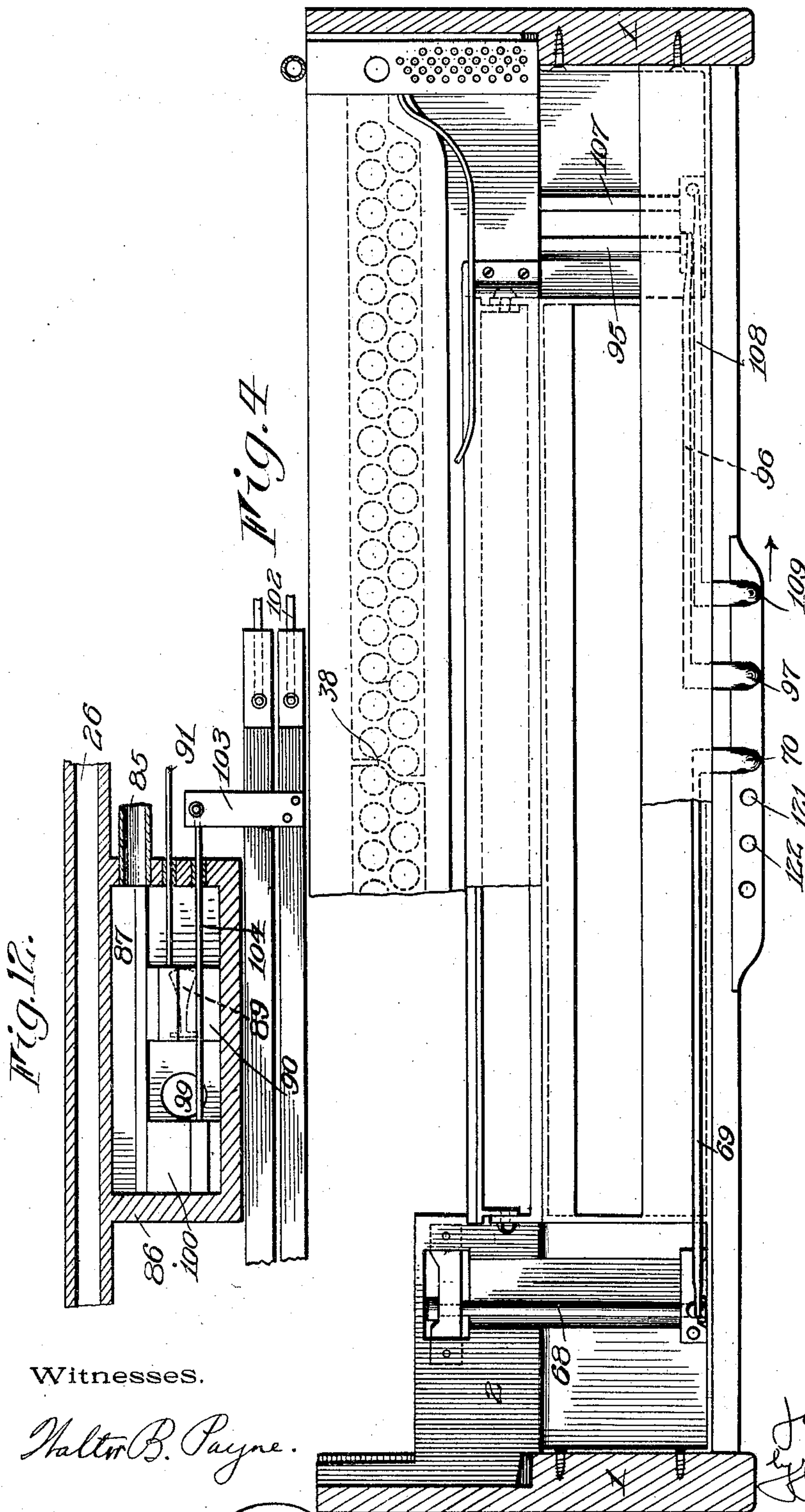
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7 SHEETS—SHEET 3.



Witnesses.

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7 SHEETS—SHEET 4.

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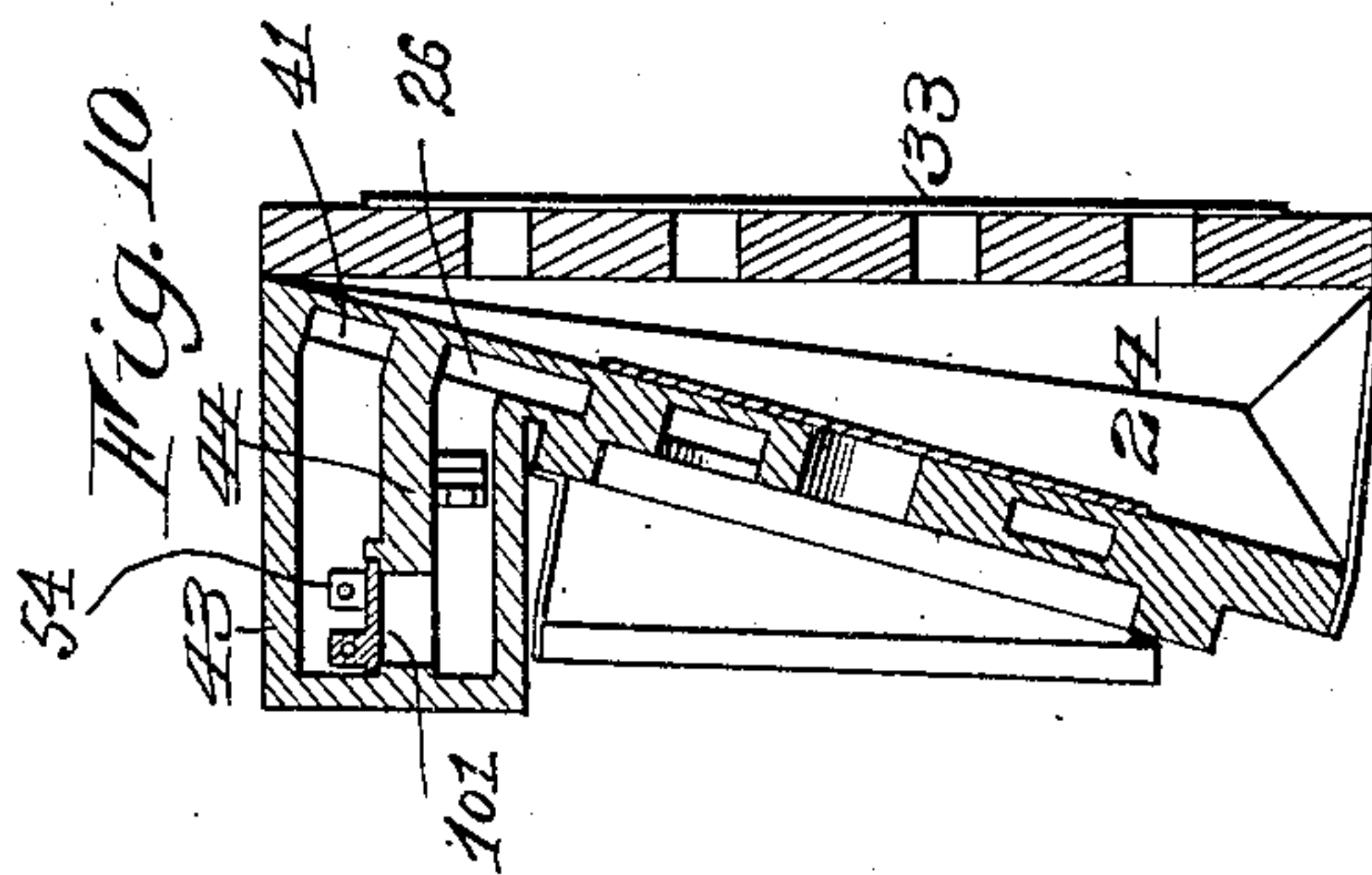
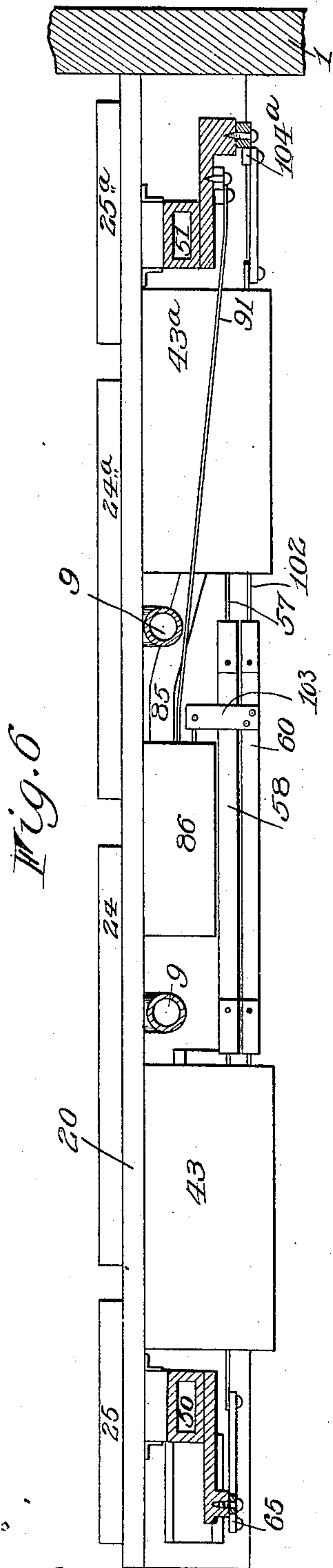
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7 SHEETS—SHEET 5.



Witnesses

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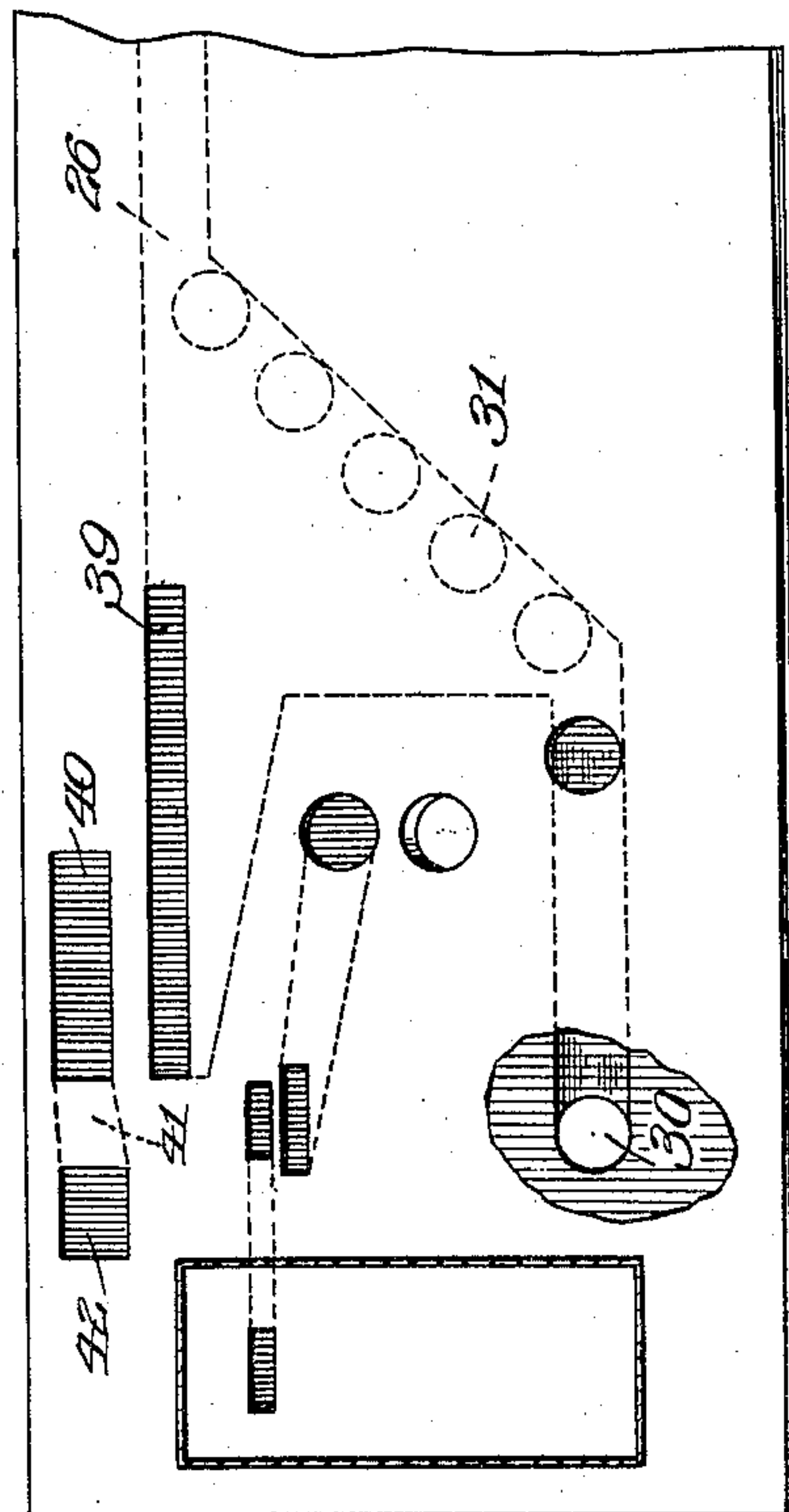
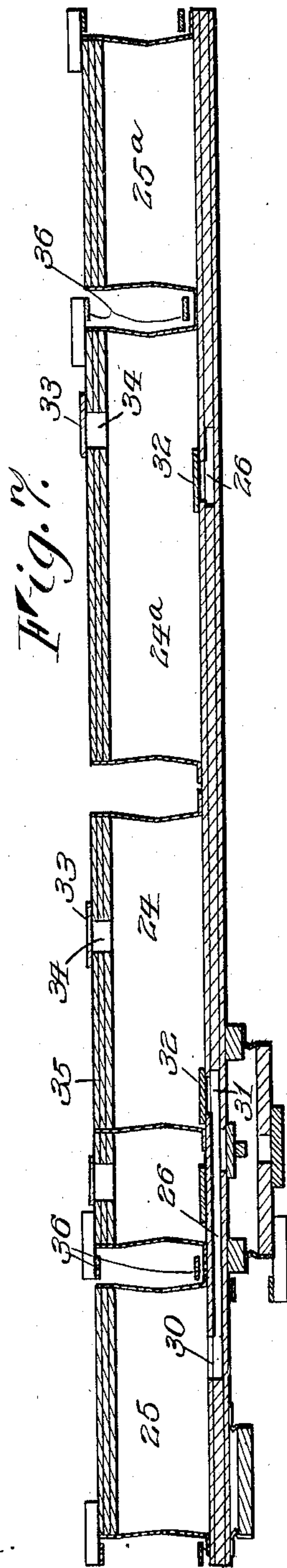
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PNEUMATICALLY OPERATED MUSICAL INSTRUMENT.

APPLICATION FILED DEC. 9, 1904.

7 SHEETS—SHEET 6.



Witnesses.

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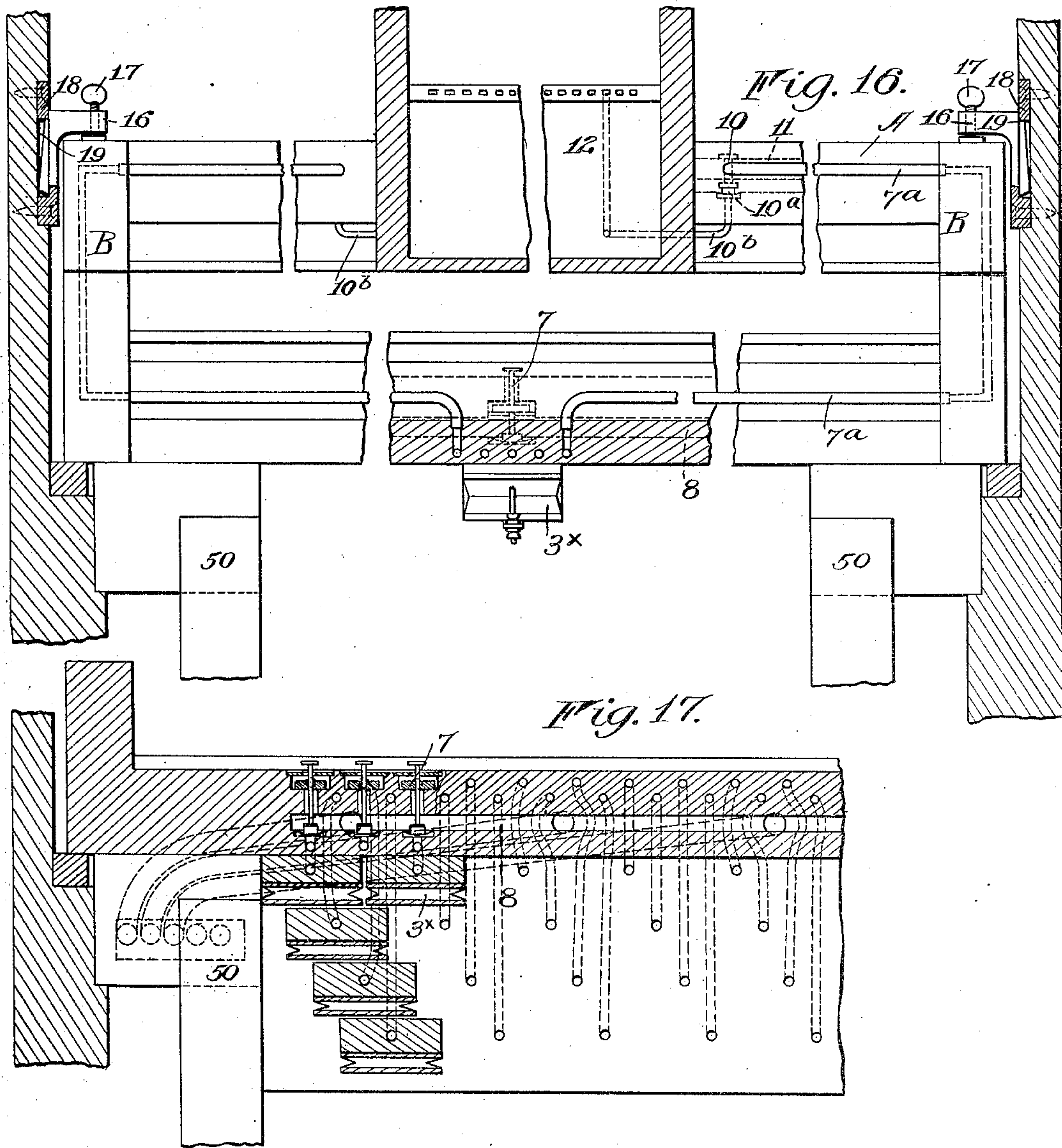
PATENTED APR. 16, 1907.

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PNEUMATICALLY OPERATED MUSICAL INSTRUMENT.

APPLICATION FILED DEC. 9, 1904.

7 SHEETS--SHEET 7.



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UNITED STATES PATENT OFFICE.

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PNEUMATICALLY-OPERATED MUSICAL INSTRUMENT.

No. 850,366.

Specification of Letters Patent.

Patented April 16, 1907.

Application filed December 9, 1904. Serial No. 236,251.

To all whom it may concern:

Be it known that I, JOHN J. HEALY, of Monroe, in the county of Monroe and State of New York, have invented certain new and useful Improvements in Pneumatically-Operated Musical Instruments; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification, and to the reference-numerals marked thereon.

My present invention relates to wind instruments, and particularly to that class known as "automatic piano-players," which, in addition to the usual piano mechanism—such as the strings, keys, and dampers—embody pneumatic-operating devices the movement of which is controlled by a music-sheet traveling over a tracker-board, said sheet being provided with perforations whereby the passages in the tracker-board will be opened or closed to vent certain of the pneumatic devices and cause the operation of a particular key or keys and the sounding of their respective notes.

My invention has for its object to provide an improved form of pneumatic-operating device by means of which the expression of a given note or set of notes may be modulated from a minimum touch to a forte effect and which will also allow a particular note appearing in a modulated or softened passage to be given an independent expression without affecting those notes caused to be sounded by perforations preceding or succeeding that perforation representing the accented note.

My invention also comprehends an arrangement of valves controlling the supply of air to the motor, whereby the rerolling or rewinding of the music-sheet may be accomplished easily and quickly, said valves being arranged for conjoint operation with those controlling the supply of air to the pneumatic devices, enabling the latter to be automatically shut off during the rerolling operation.

To these and other ends my invention consists in certain improvements and combination of parts, all as will be fully set forth in the claims at the end of this specification.

In the drawings, Figure 1 is a cross-sectional view of a piano-breast, showing the keys, the pneumatics for operating them, and the tracker-board. Fig. 2 is a similar

view, on a reduced scale, taken on the line 2× 2× of Fig. 5. Fig. 3 is a top plan view of one-half of the piano-breast, the top of the casing being omitted. Fig. 4 is a similar view in section, showing the supporting-frame located beneath the key-bed. Fig. 5 is a front elevation of the support or division-board on which the bellows are mounted, showing portions of the wind-trunks in section and the valves therein. Fig. 6 is a top plan view partly in section and taken on the line 6× 6× of Fig. 5. Fig. 7 is a longitudinal sectional view on the line 7× 7× of Fig. 5. Fig. 8 is a front elevation showing one end of the division-board with the wind-trunks and other parts removed to better illustrate its internal construction. Figs. 9 and 10 are vertical sectional views on the lines 9× 9× and 10× 10×, respectively, of Fig. 5. Fig. 11 is a horizontal sectional view through one of the wind-trunks, showing the arrangement of the valves therein. Fig. 12 is a similar view of the valve-box in the motor wind-trunk. Fig. 13 is a detail sectional view taken longitudinally of the valve-chest, showing its connection with the wind-trunk and the means for causing an equal distribution of the air in said chest. Fig. 14 is a detached perspective view illustrating the connection of the supplemental expression-valve with the tracker-board and its manual controlling-valve. Fig. 15 is a detail perspective view of the clamping device employed for locking in place the member comprising the wind-chest. Fig. 16 is a detail front elevation of the member supporting the tracker-board and primary valves and the devices for securing it in the piano-casing. Fig. 17 is a view similar to Fig. 13, showing in a different form the connection of the wind-trunk with the valve-chest.

Similar reference-numerals in the several figures indicate similar parts.

In illustrating my invention I have shown it applied to an upright pianoforte arranged within a casing comprising the sides 1, between which is supported a frame 2, preferably constructed of metal and adapted to form a rest for the bed of keys or manuals 3 and also to hold the devices for operating the latter. As the remaining portions of the piano-action may be of the usual or any preferred form of construction, special illustration and description thereof in this instance

will be unnecessary, it being understood that the depression of a key will cause the corresponding note to be sounded in the usual manner.

5 The operating mechanism for manipulating the keys consists of the bellows or key-pneumatics 3^x, arranged beneath the key-bed in horizontal rows and vertical tiers and connected, by means of jacks 4, to the ends of
10 levers 5, the forward ends of which project over a laterally-extending end of a rod or finger 6, depending from the forward end of each of the respective keys. The operation of each of the bellows is governed by a second-
15 ary valve 7, regulating the flow of air from the bellows to the wind-chest 8, from which the air is exhausted through a wind-trunk, such as 50 or 51, Fig. 5, as will be further described. The movement of the secondary
20 valve is governed by a primary valve 10, controlled by air in a wind-chest 11, and a diaphragm 10^a, covering a passage 10^b, opening at the tracker-board 12, and with which the perforations in the music-sheet 13 co-
25 operate as said sheet is unwound from the spool or holder 14 onto the winding spool or reel 15. The air in the primary wind-chest 11 is exhausted through one or more pipes or wind-trunks 9 and each primary valve 10
30 being normally in a position to open the controlling-passage 7^a leading from it to the secondary valve in the wind-chest 8 its respective secondary valve will be allowed to rest in position to normally disconnect its key-pneu-
35 matic or bellows 3 from the secondary wind-chest 8. The operation of said primary and secondary valves and passages by which they are connected, respectively, to the tracker-board and the key-pneumatics or
40 bellows are illustrated fully in my pending application, Serial No. 136,530, and as their construction is well understood they do not require further illustration or description to
45 enable those skilled in the art to readily understand the operation of the cooperating parts embodying the features of my invention, all of which will be described more in detail. The primary valve-chest is provided
50 in a horizontally-extending member A, on which the tracker-board and cooperating parts are arranged centrally, the passages connecting the primary and secondary valves leading around the ends of the key-bed through divided headers B, one portion of
55 which is removable with the primary valve-chest member. In order to facilitate the removal of the latter, I provide clamping devices for securing it in place, consisting of dogs having outwardly-extending arms 16,
60 carrying set-screws 17, adapted to bear against the top of the valve-chest member at its ends, as shown in Figs. 15 and 16. The outer end of each dog extends downwardly and projects through and engages in
65 rear of a plate 18 on the side of the casing, the

edge of said plate being engaged by the notch 19, which receives the upward and outward thrust when the screw 17 is set up.

Extending transversely of the piano-casing between the sides 1 thereof and beneath the bank of key-pneumatics is arranged a support in the form of a board 20, which rests at the ends of its bottom edge upon lugs 21 and engages the supports or brackets 22 at its rear side, as shown in Fig. 2, an arrangement
75 which permits the board to be revolved forwardly and removed when the front panel 23 of the casing is opened, said board being normally held in place by the connections between the wind-trunks and other devices sup-
80 ported thereon, which for convenience in assembling the parts are made readily detachable, as will be further described.

At the rear side of the division-board are arranged the two feeder or pumping bellows
85 24 and 24^a and main bellows 25 and 25^a, all of which are connected by an internal passage 26 in the division-board. One-half of this passage is shown in dotted lines in Fig. 8, from which, it will be seen, communication
90 is had with the main bellows through apertures 30, which are open, while similar passages 31, opening into feeder-bellows, are closed by flap-valves 32, which operate alternately with the similar valves 33, arranged
95 over openings 34 in the movable back boards 35 of the feeder-bellows. The latter are opened outwardly by springs 36 and are collapsed by the operation of pumping-pedals 37. This passage 26 constitutes a common wind-trunk
100 from which branches lead to the key-pneumatics, there being one branch for each group into which said pneumatics are divided. In the present instance two groups
105 are shown, one including the devices for operating those keys at the bass side of the instrument and the other group the corresponding pneumatic devices at the treble side of the piano, said grouping being accomplished
110 by dividing the wind-chest 8 of the secondary valves transversely by an intermediate partition 38, as shown in Fig. 13. In this figure I have also illustrated means for equalizing the air-pressure throughout the length
115 of the wind-chest. To accomplish this object, I arrange in the chest a diaphragm or partition 8^x, provided with perforations x, as shown. As this partition is located between the wind-trunk entrance 150 and the valves
120 in the wind-chest, it will be seen that the air-pressure is distributed, so that the more remote valves will respond as quickly as those adjacent the wind-trunk. This same effect might be produced by increasing the number of wind-trunk branches 50 and 51 and lead-
125 ing each of them into the respective divisions of the wind-chest at various points, as shown in Fig. 17.

For each branch wind-trunk the division-board 20 is provided with an aperture 39, 130

opening into the passage 26, above which is a similar aperture 40, communicating with the laterally-extending passage 41, terminating in an opening 42. Secured to the face of the division-board and embracing the apertures 39 and 40 are wind-trunk boxes 43 and 43^a, Figs. 5 and 11, divided horizontally by a partition 44, which contains apertures controlled by suitable valve devices governing the flow of air from the main bellows to the secondary wind-chest 8. In the present instance the treble and bass chambers of the secondary wind-chest are connected, respectively, by trunks 50 and 51 with their corresponding apertures 42, said chambers and trunks, the passages 41, the boxes 43 43^a, and the passage 26 constituting the whole wind-trunk, the air in the separate wind-trunks and main bellows being equalized through the passage 26.

The box 43, forming part of the bass wind-trunk, is provided with an aperture 52, the area of which may be adjusted by a set-screw 53, Fig. 11, to permit the minimum amount of air to be exhausted, which will operate the key-pneumatics to strike a note with the minimum or softest touch. This aperture may be entirely closed by a valve-head 54, which also coöperates with an aperture 55, the sides of which converge toward the end farthest away from the aperture 52, while its proximate end is located at such a point that the valve-head 54 will not begin to cover it until said head has entirely uncovered the aperture 52. By this means the expression of any given set of notes may be modulated from forte to mezzo forte or pianissimo by moving the valve-head 54 to open and close the aperture 55. These corresponding parts are also to be found in the box 43^a in the treble wind-trunk, and in Figs. 5 and 11 they are shown particularly and indicated by the following reference-numerals: 52^a, 54^a, and 55^a. Inasmuch as the general expression given to the notes in a particular passage of music is ordinarily accented alike in both the treble and bass, I connect the corresponding valve-heads 54 and 54^a by a rod 57, the central section 58 of which is for convenience made removable. At one side of the instrument the connecting-rod 57 is attached to a lever 65, joined to a link 66, attached to a lever 67 on the rock-shaft 68, which is oscillated by a longitudinally-movable rod 69, having at its end a suitable knob or handle 70, located at the center of the piano, the movement of which either to the right or left will open or close the apertures 52 and 52^a and will also graduate the size of the apertures 55 55^a, said apertures 52 and 55 in each of the boxes being arranged relatively, so that the valve-heads 54 and 54^a therein will open their respective apertures 52 52^a before commencing to close the apertures 55 55^a.

Mounted on the forward sides of the divi-

sion-board 20 and removable therewith is a motor device comprising bellows 81 and a driving-shaft 82, on which is mounted a sprocket-wheel 83, connected by any suitable form of driving connection 84 to the winding-spool 15, as will be understood. The air for operating the motor is exhausted through a tube or passage 85, leading from the upper compartment of the wind-trunk box 86 above the partition 87, the chamber beneath the latter being connected to the passage 26 through an aperture 88. The partition 87 is provided with a graduated aperture 89, and coöperating therewith is a valve-head 90, to which is connected a rod 91, attached to a lever 92, joined by the link 93 to the lever 94 on the rock-shaft 95, to which is also connected the rod 96, carrying the knob 97. By a lateral adjustment of the knob 97 the valve-head may be shifted to regulate the volume of air in the motor wind-trunk and control the speed of the motor, thereby establishing the tempo in which the musical selection or a particular portion thereof is rendered, which is determined by the speed or rate of travel of the music-sheet over the tracker-board as it is wound from the spool 14 onto the reel 15.

It is the desideratum to rewind the music-sheet onto the spool 14 after the completion of the musical section with a greater amount of speed than that at which it travels when wound onto the reel 15, and I therefore provide a special aperture 99 in the partition 87 of the motor wind-trunk box 86, which when opened will permit air to be exhausted more freely to operate the motor at a high rate of speed. The aperture 99 is normally closed by a valve-head 100. In order to prevent the operation of the key-pneumatics and other devices during the rewinding operation, I provide in each of the boxes 43 43^a valve-heads 101 101^a, which coöperate, respectively, with the apertures 55 55^a to close them, said heads being located at one side of the valve-heads 54 54^a and connected by a rod 102, comprising a removable section 60, so that when adjusted laterally in one direction by a movement of the rod they will engage the valve-heads 54 54^a and move the latter into their normal position, closing the apertures 52 52^a. The opening of the motor-passage simultaneously with the movement of the valve-heads to close the passage in the wind-trunks of the various pneumatic devices is accomplished by connecting the valve-head 100 to the section 60 of the rod 102 by means of the arm 103 and a short rod 104, as shown particularly in Fig. 12. The longitudinal movement of the connecting-rod 102 is caused by the rocking movement of a pivoted lever 104^a, which is joined by a link 105 to an arm 106 on a rock-shaft 107, to which is attached a rod 108, having at its inner extremity a knob or handle 109.

Occasionally it is desirable to increase the

force with which a particular note is sounded, so that if the note appears in a forte passage it may be given a double forte expression, or if the note appears in a passage required to be played softly or with a pianissimo effect said note may be produced with the ordinary forte expression, and to this end I provide each of the branch wind-trunks 50 51, leading to each group of key-pneumatics, 10 with a by-pass valve which may be used separately or in conjunction with either of the valves controlling the apertures 52 or 55. This additional expression is obtained by controlling the flow of air through apertures 15 110, located in the partitions 44 of the wind-trunk boxes 43 and 43^a, by the valve-heads 111, carried on arms 112, which are normally held in the closed position by springs 113. At the outer end of each arm is a disk 114, 20 against which engages a large puff or flexible diaphragm 115, said puff or diaphragm being normally collapsed, as shown in Fig. 5, and expanded by the admission of air to its inner side through the passage 116, leading from 25 the tracker-board and passing through a secondary valve 117 and a primary valve 118—an arrangement which permits the size of the passage to be proportionately increased as it leads from one valve to the other and from 30 the secondary valve to the upper side of the diaphragm, whereby the necessary volume of air is admitted freely thereto, permitting the diaphragm to respond with alacrity whenever the passage 116 is vented. It will also 35 be noted that the puff is located on the side of the partition adjacent the bellows or on the high-tension side, where the pressure of the air is constantly exerting a force to operate it, causing said valve to move instantaneously when its operation is required. In- 40 dependent manual control of the valve-head 111 is obtained by extending a separate branch passage 119 from the primary valve 118 to the center of the front rail of the piano-breast, as shown in Fig. 14, where it may be 45 vented by the operation of a small lever 120, with which engages a button 121, adapted to be depressed by the operator's finger.

As the devices just described are duplicated in each of the wind-trunks, the foregoing description will be considered as applying to that valve controlling the admission of air to the group of valves at the treble side of the instrument, and it will be understood 55 that the corresponding group of notes at the bass side of the instrument may be similarly controlled by the depressing of the button 122. (Shown in Fig. 4.)

It will be noticed that the various valves I have described control the operation of the various pneumatics by regulating the volume of air exhausted from the secondary wind-chests 8 and that the primary wind-chest is connected by the pipes or wind- 65 trunks 9 independently with the passage 26,

so that the tension or pressure of the air therein is unaffected. This is an advantage in a device of this character, because the action of the primary valves is always uniform, and subsequent operation of their respective 70 secondary valves is in no wise weakened or accelerated by the reduction or increase of the pressure of air in the other wind-chests. Further, by this arrangement, whereby the air in the primary wind-chest is always at- 75 tenuated to a desired degree, the primary and secondary valves will always respond whenever the former is vented at the tracker-board, while the operating force of the key-pneumatics may be varied from the maxi- 80 mum to the minimum by regulating the air in the secondary wind-chest to different degrees of pressure.

The operation of the various valves will now be readily understood. The music-sheet 85 contained on the spool 14 having been connected to the spool or reel 15, the operator first sets the devices in a playing position by closing the aperture 99 and opening the apertures 55 55^a by moving the knob or han- 90 dle 109 in the direction indicated by the arrow in Fig. 4. A pumping action on the feeder-bellows 24 and 24^a will then exhaust the air from and collapse the main bellows 25 and 25^a. If the operator now moves the 95 knob or handle 97, he will adjust the valve-head 90, opening to a greater or less degree the aperture 89, thus regulating the volume of air permitted to pass to the motor 81 to control the speed thereof, and consequently 100 govern the rate of travel of the music-sheet over the tracker-board, so that the time or movement of the musical selection, or any part thereof, may be varied from andante to 105 allegro. The apertures 55 55^a now being opened to their fullest extent will cause all of the notes to be given a forte expression, and if it is desired to modulate their tone the operator adjusts the knob or handle 70 to move the valve-heads 54 54^a over their respective 110 apertures 55 55^a. This movement, it will be seen, opens the apertures 52 52^a, so that if, perchance, the valve-heads are adjusted to entirely close the larger apertures the play- 115 ing of the notes will not be discontinued, but they will continue to be sounded with the minimum touch.

When a passage is being played softly and it is desired to accent a particular note—for instance, a treble note—an aperture may be 120 provided in the music-sheet which will open the passage 116, or the latter may be vented by the operator depressing the button 121. The admission of air by either means will, however, cause the successive movement of 125 the valves 118 117 and the subsequent inflation of the puff or diaphragm 115 and the opening of the aperture 110.

The rerolling of the music-sheet is accomplished in the usual manner, the motor de- 130

vice rotating in but one direction, while suitable clutch devices (not shown) are employed for alternately driving the spools 14 and 15. The clutch devices then being set in engagement with the spools 14, the operator is simply required to adjust the knob or handle 109 in a direction opposite to that before described to close the apertures 52, 55, 52^a, and 55^a and open the aperture 99, thus giving full vent to the pipe 85 and permitting the motor to operate at full speed when all the other pneumatic devices are shut off.

A musical instrument embodying my invention is simple in construction, the parts are compact, and in case of repair they may be readily removed from the casing, while the arrangement of the valves I have described increases the accomplishments of the various mechanical features of the instrument and permits a manual operation of the keys to be imitated and the most difficult technique reproduced with great accuracy.

I claim as my invention—

1. In a wind instrument, the combination with keys, key-pneumatics, a feeder-bellows and a main bellows, of a wind-trunk connecting the latter and the key-pneumatics, controlling devices interposed therein comprising a seat having an opening and a valve-head coöperating therewith, said seat being provided with an aperture to be opened when the valve-head is operated to close the first-mentioned opening.

2. In a wind instrument, the combination with keys, key-pneumatics, a feeder-bellows and a main bellows, of a wind-trunk connecting the latter and the key-pneumatics, controlling devices interposed therein comprising a seat having an aperture and a relatively larger opening, a valve-head coöperating alternately with the aperture and opening and means for operating the head.

3. In a wind instrument, the combination with keys, key-pneumatics, a feeder-bellows and a main bellows, of a wind-trunk connecting the latter and the key-pneumatics, controlling devices interposed therein comprising a seat having an aperture and a relatively larger opening which is graduated smaller at one end than at the other, a valve-head coöperating with said seat-openings to close them alternately, and means for operating the head.

4. In a wind instrument, the combination with keys, key-pneumatics, a feeder-bellows and a main bellows, of a wind-trunk connecting the latter and the key-pneumatics, controlling devices interposed therein comprising a seat having an aperture, a relatively larger opening graduated smaller toward the end farthest away from the aperture and a sliding valve-head coöperating alternately with said seat-openings and means for operating it.

5. In a wind instrument, the combination

with keys, key-pneumatics, a feeder-bellows and a main bellows, of a wind-trunk connecting the latter and the key-pneumatics, controlling devices interposed therein comprising a seat having two apertures therein, means for adjusting the area of one of them, a sliding valve-head adapted to close said apertures and devices for operating it into alternate engagement with them.

6. In a wind instrument, the combination with keys, key-pneumatics, a feeder-bellows and a main bellows, of a wind-trunk connecting the latter and the key-pneumatics, controlling devices interposed therein comprising a seat having two apertures, one of them of a size to permit the minimum amount of air to pass required to operate the key-pneumatics and the other of a size to permit a larger amount of air to pass to said bellows, a valve-head coöperating with said apertures and means for operating it.

7. In a wind instrument, the combination with keys, key-pneumatics, a feeder-bellows and a main bellows, of a wind-trunk connecting the latter and the key-pneumatics, controlling devices interposed therein comprising a seat having two apertures, one of them of a size to permit the minimum amount of air to pass required to operate the key-pneumatics and the other of a size to permit the maximum amount of air to pass to said bellows, a valve-head coöperating with both apertures and arranged to open the minimum passage as it commences closing the maximum passage and means for operating the head.

8. In a wind instrument, the combination with keys, key-pneumatics, a feeder-bellows and a main bellows, of a wind-trunk connecting the latter and the key-pneumatics, controlling devices interposed therein comprising a seat having two apertures, one of them of a size to permit the minimum amount of air to pass required to operate the key-pneumatics and the other of a size to permit a larger amount of air to pass to said bellows, said last-mentioned aperture being graduated smaller toward one end, a valve-head normally closing the smaller aperture and coöperating with the larger aperture to vary the size thereof and means for operating the valve-head.

9. In a wind instrument, the combination with keys, key-pneumatics arranged in groups, a feeder-bellows and a main bellows, of separate wind-trunks connecting each group of key-pneumatics with the main bellows, controlling devices interposed in each wind-trunk comprising a valve-seat having a minimum and a maximum aperture and a valve-head coöperating alternately with said apertures, devices connecting said heads and means for operating the latter simultaneously to permit equal volumes of air to pass through the separate wind-trunks.

10. In a wind instrument, the combination with keys, key-pneumatics, a bellows and a wind-trunk connecting the latter to the pneumatics, of a valve for controlling the passage
5 of air in said trunk and means for operating it, a separate valve for permitting an additional supply of air to pass therethrough, a pneumatic device for operating it, a normally closed passage controlling said device
10 and means for flushing it.

11. In a wind instrument, the combination with keys, key-pneumatics, a bellows and a wind-trunk connecting the latter to the pneumatics, of a valve for controlling the
15 passage of air in said trunk and means for operating it, a separate valve for permitting an additional supply of air to pass therethrough, a pneumatic device for operating it, a controlling-passage therefor and means for flushing
20 the passage.

12. In a wind instrument, the combination with keys, key-pneumatics, a bellows and a wind-trunk connecting the latter to the pneumatics, of a valve-seat board arranged across the trunk provided with two
25 apertures, an adjustable valve-head cooperating with one aperture means for operating it and a second valve-head normally closing the other aperture, a pneumatic device controlling said head and means for flushing the
30 pneumatic.

13. In a wind instrument, the combination with keys, key-pneumatics, and bellows, and a wind-trunk connecting the latter to the pneumatics, of a valve-seat board arranged across the trunk provided with an aperture, a valve-head for closing the aperture and a normally collapsed pneumatic device for operating the head arranged on the bellows side of the seat-board and means for
40 flushing said device.

14. In a wind instrument, the combination with keys, key-pneumatics, a bellows and a wind-trunk connecting the latter to the pneumatics of a valve-seat board arranged across the trunk provided with an aperture, a valve-head for closing the aperture and a normally collapsed pneumatic device for operating the head opening in the direction of
50 the movement of air in the trunk and means for flushing said device.

15. In a wind instrument the combination with keys, key-pneumatics and a bellows, a tracker-board, sheet-winding mechanism, and a motor for operating it, of a
55 wind-trunk connecting the bellows to the pneumatics, a second wind-trunk connecting it to the motor and a valve-seat board arranged in the first wind-trunk provided with two apertures, a valve-head for alternately closing said apertures and means for operating it, a valve for opening and closing the motor wind-trunk, an auxiliary valve-head, for closing one of the aforementioned apertures and connected to the motor wind-
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trunk valve and cooperating with the other valve-head to close the other aperture when the motor wind-trunk valve is opened and means for operating said valve-head.

16. In a wind instrument, the combination with keys, key-pneumatics and feeder and main bellows, of a wind-chest having passages leading therefrom, a plurality of valves controlling said passages, a wind-trunk leading from the bellows and connected to the chest at various points.
70

17. In a wind instrument, the combination with keys, key-pneumatics and feeder and main bellows, of a wind-chest having passages leading therefrom, a plurality of
80 valves controlling said passages, a wind-trunk leading from the bellows and connected to the chest and a perforated partition arranged in the chest and located between the wind-trunk entrance and the valves.
85

18. In a wind instrument, the combination with keys, key-pneumatics and valves controlling the latter arranged in groups, of a plurality of bellows, a common wind-trunk connecting them, separate wind-trunks leading from the latter to each group of valves, valves in the separate wind-trunks and means for operating them, a normally closed by-pass valve also located in each wind-trunk, and means for opening and closing
95 said valves.

19. In a wind instrument, the combination with keys, key-pneumatics and valves controlling them, of bellows, a wind-trunk connecting the latter to the pneumatics, a
100 valve controlling the passage of air in the wind-trunk, a by-pass valve for increasing said passage of air and means for operating it.

20. In a wind instrument, the combination with keys, key-pneumatics, valves controlling the latter arranged in groups and a
105 tracker-board having passages controlling the valves, a plurality of bellows, a common wind-trunk connecting them, of a separate branch wind-trunk leading from the latter to each group of valves, valves in the branch wind-trunks and normally closed by-pass valves also located therein, pneumatic devices for operating them and means for flushing said devices controlled by a passage in
115 the tracker-board.

21. In a wind instrument, the combination with keys, key-pneumatics, valves controlling the latter arranged in groups and a
120 tracker-board having passages controlling the valves, a plurality of bellows, a common wind-trunk connecting them, of a separate branch wind-trunk leading from the latter to each group of valves, valves in the branch wind-trunks and normally closed by-pass valves also located therein, pneumatic devices for operating them and a passage at the tracker-board and a normally closed manually-operable valve in the passage.
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22. In a wind instrument, the combination
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tion with a casing, keys therein and key-pneumatics, valves controlling the latter, a tracker-board having passages controlling the valves and a music-sheet-winding mechanism, of a hollow support forming a wind-trunk removably mounted in the casing, bellows arranged at one side of the support and communicating with its interior and a branch wind-trunk leading to the pneumatics and detachably connected to said support, a wind-motor mounted on the latter, driving

connections between it and the winding devices, and a valve-box mounted on the support and also communicating with its interior, a wind-trunk connecting said motor and box, a valve located in the latter and means for operating it.

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