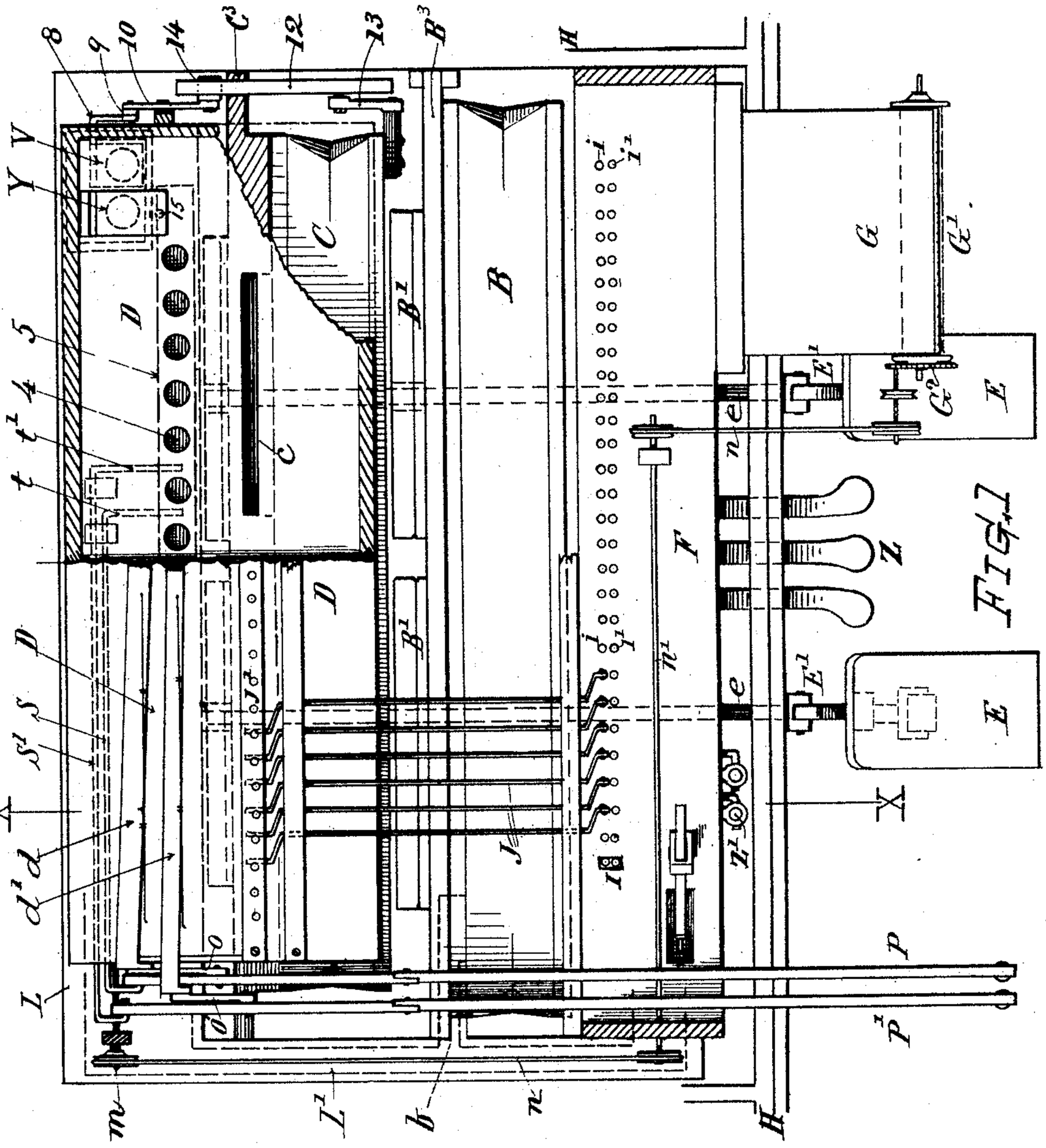
(No Model.) 4 Sheets—Sheet 1.

W. D. PARKER.

AUTOMATIC COMBINATION PIANO.

No. 587,270. Patented July 27, 1897.



Witnesses.

Ella P. Blenus

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(No Model.) 4 Sheets—Sheet 2.

W. D. PARKER.

AUTOMATIC COMBINATION PIANO.

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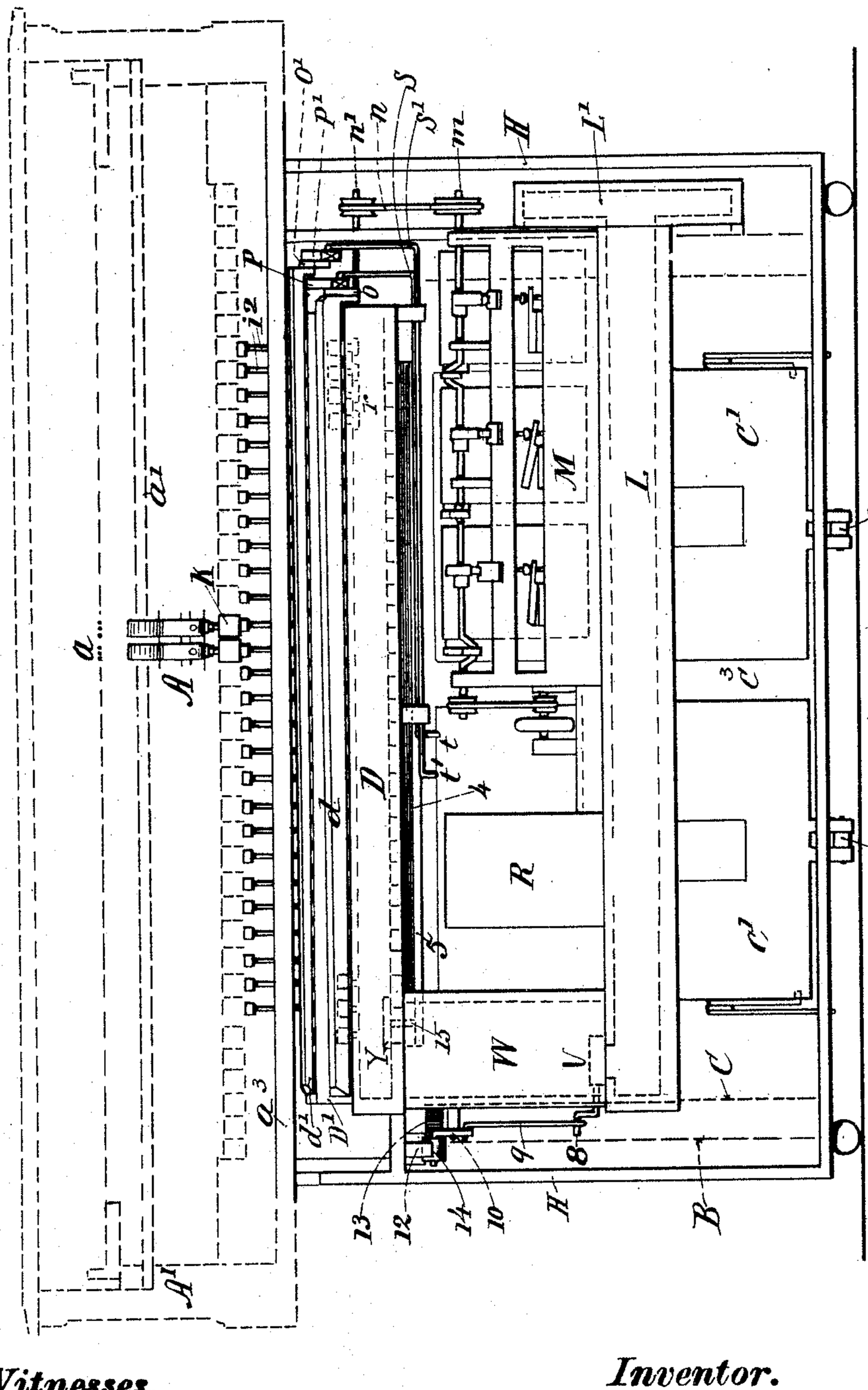

FIG. 2.

Witnesses.
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4 Sheets—Sheet 3.

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AUTOMATIC COMBINATION PIANO.

No. 587,270 Patented July 27, 1897.

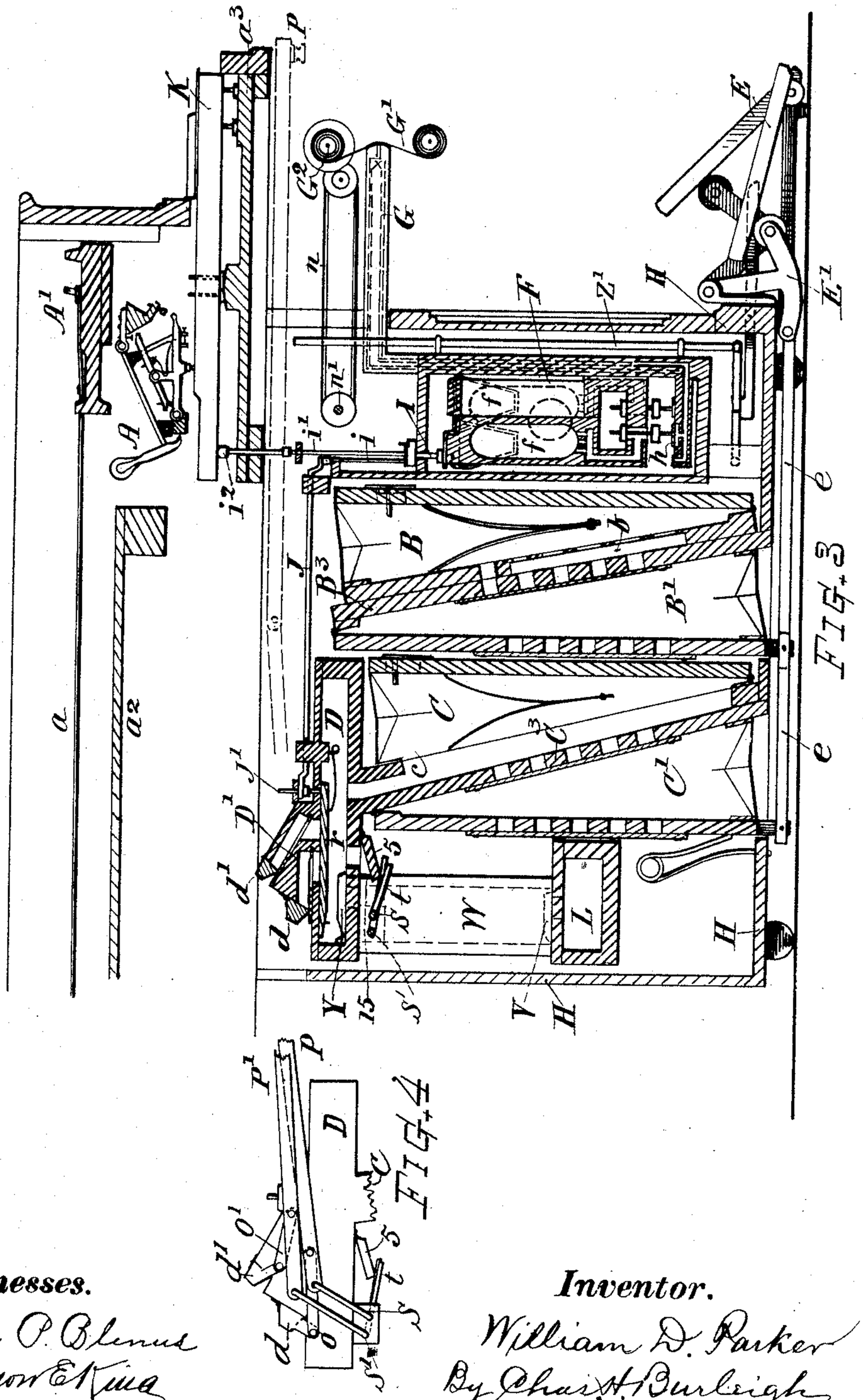

FIG. 3

FIG. 4

Witnesses.

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(No Model.) 4 Sheets—Sheet 4.

W. D. PARKER.

AUTOMATIC COMBINATION PIANO.

No. 587,270. Patented July 27, 1897.

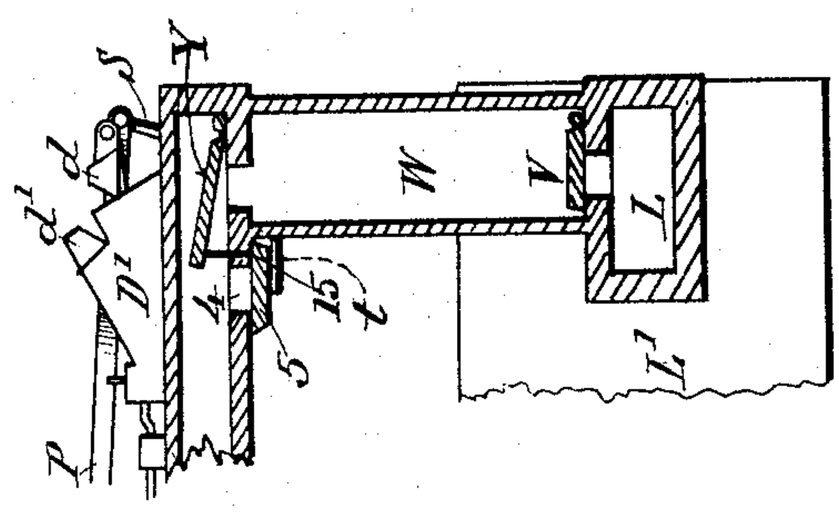

FIG. 6

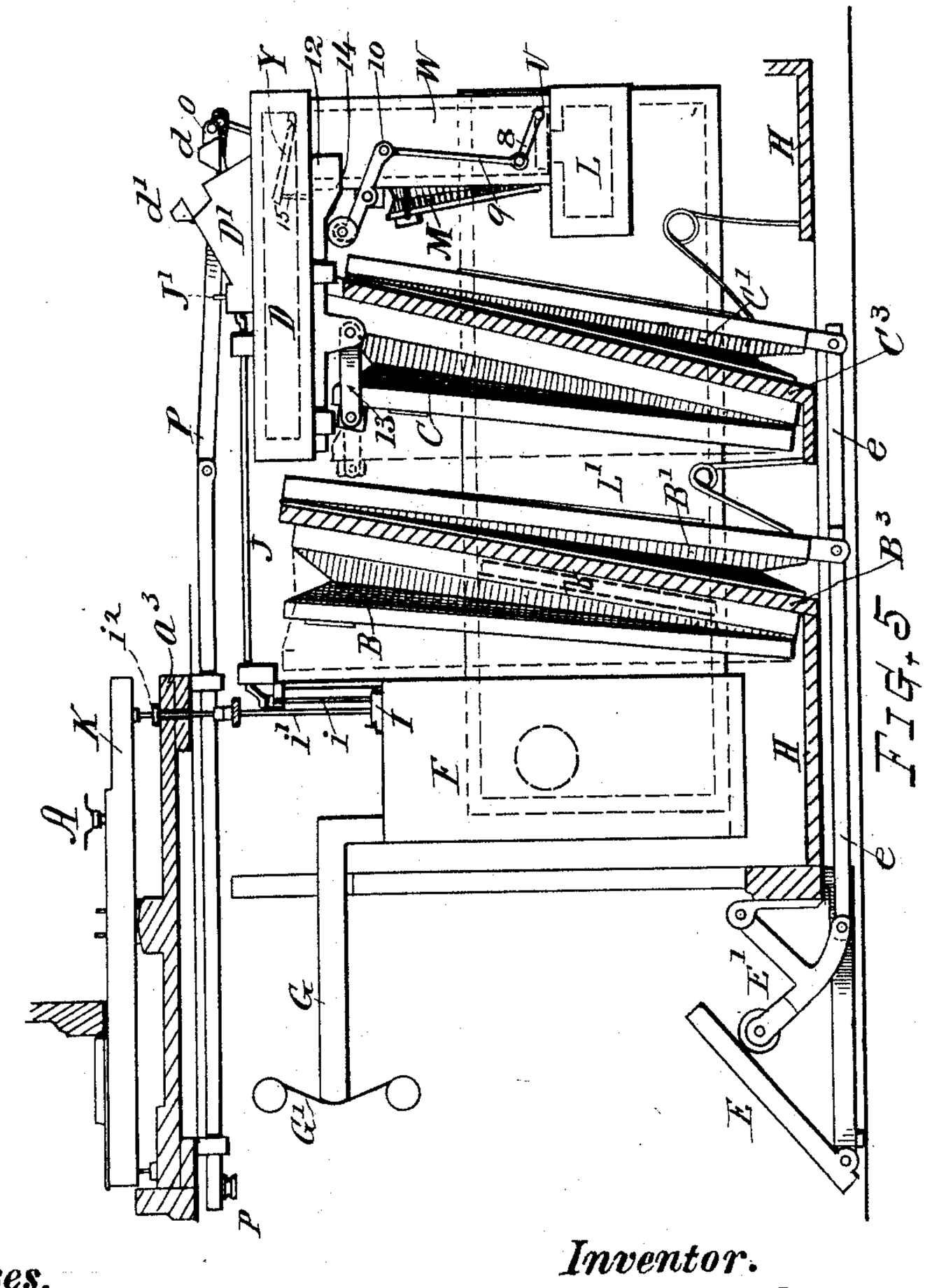

FIG. 5

Witnesses.

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UNITED STATES PATENT OFFICE.

WILLIAM D. PARKER, OF MERIDEN, CONNECTICUT, ASSIGNOR TO EDWARD H. WHITE, OF SAME PLACE.

AUTOMATIC COMBINATION-PIANO.

SPECIFICATION forming part of Letters Patent No. 587,270, dated July 27, 1897.

Application filed March 8, 1897. Serial No. 626,450. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM D. PARKER, a citizen of the United States, residing at Meriden, in the county of New Haven and State of Connecticut, have invented a new and useful Automatic Combination-Piano, of which the following, together with the accompanying drawings, is a specification sufficiently full, clear, and exact to enable persons skilled in the art to which this invention appertains to make and use the same.

One object of my present invention is to provide a pneumatic-actuating mechanism and reed-organ attachment adapted for combination with a grand or square piano of usual form for automatically playing the piano-action with or without reed accompaniment, and which can be readily applied to pianos of the class named after the same have been manufactured or in use without injury or material change in the piano structure.

Another object of my invention is to provide an automatic combination-piano mechanism with a dual system of bellows, comprising a reservoir and exhausters simultaneously operated by the same pedal movement, one part adapted for inducing a strong air-current for operating the pneumatic-playing mechanism and motor that runs the music-sheet-winding devices, the other part adapted for inducing a less forceful air-current for sounding the organ-reeds; also, to provide such mechanism with facilities for the relief of the reed-supply bellows from pumping resistance when the reed sets are mute.

Another object is to provide, in an automatic combination-piano having two sets of bellows simultaneously operated by the same pedals, means operating in conjunction with the mutes that close the reed-cells for freely admitting air to the reed-supply bellows when all of the reed-organ attachment is out of use and stopping such free admittance and renewing the exhaust effect of said bellows when any mute is opened.

Another object is to afford an air connection between the reed-sounding bellows and the pneumatic-operating bellows, with means for automatically opening such connection when the air-pressure induced by said reed-sounding bellows becomes weak or falls below the normal required tension, thereby bringing the effective power of the pneumatic-operating bellows temporarily into aid of the reed-operating bellows for restoring effective action of said reed-sounding bellows to normal condition and then closing said connection, as more fully hereinafter explained.

These objects I attain by mechanism the nature and organization of which are shown in the drawings, wherein—

Figure 1 is a plan view, partly in section, illustrating my invention as adapted for a combination automatic grand piano. Fig. 2 is a rear view of the same with dotted lines indicating the position of the piano-body. Fig. 3 is a section at line X X on Fig. 1, looking from the left. Fig. 4 is a detail view of the connections for working the mutes and relief-valve. Fig. 5 is an end view looking from the right, and Fig. 6 is a section showing the windway and valves for uniting the bellows-pressures.

It will be understood that such portions of the complete piano as are not herein shown or specifically described may be of any suitable construction.

The piano-action A, the body and frame A′, the strings a, sound-board a^2, key-table a^3, and manual-keys K may be of the general well-known construction and horizontal arrangement usually employed in grand or in square pianos and need not be herein more particularly described.

The term "piano-action" as herein used means the group of devices actuated by the key and operating for sounding the strings.

B and C indicate two sets of bellows, each comprising an equalizing-reservoir and a pair of exhausters or pumping-boxes B′ and C′, supported on transverse body-boards within a suitable casing or frame H, that is adapted to be arranged in connection with and beneath the body of the piano, as illustrated.

The body-boards B^3 and C^3 are disposed in approximately upright or slightly oblique positions and rigidly fixed stationary within the case or frame H between the pneumatic-chest and the motor wind-chest, the board C^3 being preferably beneath the reed wind-chest. The bellows-reservoirs are hinged at their lower edge to the front side of the body-boards,

and the exhausters B′ and C′ are respectively hinged at their upper edges to the rear side of said boards, with their movable edge downward and provided with ears below the case. The exhausters B′ and C′ at each side are respectively connected by a pivot or hinge with jointed links or bars *e*, which pass underneath the bellows and case to the swinging pedals E and pedal-levers E′, to which latter the fore ends of the bars *e* are respectively connected, so that when a pedal is depressed it imparts simultaneous backward movement to the two exhausters, right or left, and operates both sets of bellows by the same pedaling action.

D indicates a wind-chest connected with the bellows C and surmounted by the reed-board D′, containing a set or sets of reeds, with mutes *d* and reed-duct valves *r*, forming the organ attachment.

F indicates the pneumatic-chest, containing the controlling-pneumatics *h* and the action-operating pneumatics *f*, also having connected therewith the tracker G for the traveling perforated music-sheet G′. Air-ducts lead from said tracker to the respective controlling-pneumatics *h*. The pneumatics and the means (not shown) for supporting and shifting the music-winding rolls may be substantially the same in construction and operation as described in Letters Patent No. 470,323, to which reference can be had for a more full and complete description of said parts.

I indicates the vertically-moving puppet, which is actuated by the operating-pneumatic. The head of this puppet is formed as a step for two pitman-pins *i* and *i′*, one of which, *i′*, extends upward and engages in a direct line with the auxiliary puppet i^2, that impinges against the under side of the manual-key K, while the other, *i*, operates the lever or rocker-wire J, that works the playing-valve *r* of the reed-duct, the cranked rear end of said rocker-wire engaging a collar fixed on the valve-pitman J′, so that the valve will open when the puppet I is lifted and simultaneously with the operation of the piano key and action by the pitman *i′*.

It will be understood that the puppets I, pitman-pins *i i′*, rocker-levers J, &c., are arranged in series to correspond with the keys of the manual and the several notes of the piano and reed scale; but only a few of such parts are shown in the drawings, sufficient to illustrate their structure and operation.

L indicates a wind-chest having the motor-engine M and regulator R mounted thereon, which parts operate in well-known manner. Motion is transmitted from the motor-shaft *m* to the music-sheet-winding rolls G^2 by the belts *n* and shaft *n′*.

The wind-chests F and L are connected by the wind-trunk L′ with the bellows B, the air entering the bellows through the side passage *b*. The wind-chest D and reed-cells are exhausted by the bellows C, the air entering said bellows through the throat-passage *c*.

The bellows B is best made larger than the bellows C and is constructed to give high tension or stronger pressure to its induced air-currents, which work the motor M and pneumatic-action, than does the bellows C, which latter may be of low tension for inducing a more moderate air-current for sounding the reeds. I thus avoid in the reed-sounding current the high degree of pressure which tends to produce false tones on the reeds, but which high tension is desirable for quickly and forcefully inflating and collapsing the pneumatics and working the action mechanism and is herein attained by bellows B. It also preserves the reed-current from the extreme and sudden fluctuations of pressure occasioned by bringing a greater or less number of pneumatics into action at the same instant of time or in giving strong or light effect in the pneumatic movements.

In connection with the bellows C, I provide an ample free-air inlet 4, in the present instance opening into the wind-chest D from beneath and controlled by an inlet stop-valve 5, that is actuated in conjunction with the mute or mutes *d d′* of the reed sets, said valve closing when the mutes or either of them open and opening when the mutes are all closed. This valve and inlet-passage relieves the bellows C from all labor, except mere movement of the exhausters C′, when the reed attachment is out of action and instantly brings said bellows into effective operation when the reed-cells are opened for sound. The mechanism for accomplishing this result consists, in the present instance, of the pull-bar P, having its rear end connected with the cranked end of the rocker-shaft S and coupled by a link O to the arm of the mute *d*. The rocker-shaft is provided at its other end with a finger *t*, that underlies or engages the valve 5 and closes said valve when the pull is manipulated for opening the mute *d*, and vice versa. Similar connections, consisting of the pull P′, link O′, and rocker-shaft S′, with fingers *t′*, are combined with the second mute *d′*. The fingers *t* and *t′* being separately operated, either one will close the valve 5 when any mute is opened, and the valve will not open until all mutes are closed.

Another feature of my invention consists in means for automatically augmenting the power of the reed-sounding bellows by power from the pneumatic-action bellows when the power of the former becomes weakened or falls below a desired normal tension. For this I provide a windway or passage W, that communicates from a compartment exhausted by bellows C C′ to a space or compartment exhausted by the bellows B B′, in the present instance from the wind-chest D into the wind-chest L. The wind-chest L is a compartment directly exhausted by the high-tension bellows B B′ through the wind-trunk L′, while the wind-chest D is a compartment directly exhausted by the low-tension bellows C C′, but the windway may, if in any

instance desired, be otherwise directed into the bellows-chambers. This windway W is controlled by a valve V, that remains normally closed. Said valve is worked by a suitable arm 8, that connects by link 9 with a tilting lever 10, carrying on its end a roll. A bar or slide 12 is connected with the movable back of the reservoir of bellows C by a suitable link 13, which bar is furnished with an inclined head or lug 14, that depresses or relieves the tilting lever and thereby actuates the valve V as said slide-bar is reciprocated in accord with the variation in the position of the bellows-reservoir.

In the operation when said bellows C is inducing a sufficiently strong current the reservoir closes in opposition to its spring, and the inclined lug being away from the tilt-lever roll (see Figs. 5 and 6) allows the valve V to remain closed; but when the power of the bellows C becomes weak its reservoir expands, drawing back the slide 12 so that its inclined head 14 depresses the lever 10 and effects the opening of the valve, permitting the exhaust action of the bellows B to temporarily and to the required degree assist or augment the power of the bellows C, this assistant action ceasing as soon as the bellows C regains its normal strength and contracts the reservoir so as to move the incline 14 from the valve-lifting lever 10.

Y indicates a supplemental cut-off valve arranged for guarding the passage W and to work in conjunction with the outside relief-valve 5 by aid of a pitman-pin 15 or suitable connection, said valve Y opening when the organ-reeds are put into operation and closing when the reeds are muted, or inversely as the valve 5 is operated. This valve Y prevents any leakage occurring by operation of the valve Y when the organ attachment is out of speaking operation or when the bellows C are performing no effective work. Hence so long as air is freely admitted to the compartment D the guard-valve Y controls the pass W and the valve V may be open, but no air can pass therethrough until the inlet stop-valve 5 is closed.

The piano-pedals Z, I arrange in the front of the case H, which takes the place of the usually-employed lyre-frame, and I provide rocker-levers and upright rods Z′ for transmitting movement from said pedals to the usual piano-expression devices, which latter are not herein shown.

What I claim as of my invention, and desire to secure by Letters Patent, is—

1. In a combination-piano attachment, comprising a pneumatic-actuating mechanism, a pneumatic motor-engine for operating the music-sheet, and a series of organ-reeds with reed-board and wind-chest therefor; the two sets of bellows, one set adapted as high-tension bellows for inducing a strong air-current and connected for operating the motor and pneumatic-actions, the other set adapted as low-tension bellows for separately inducing a lighter air-current for sounding the reeds; said bellows each consisting of a reservoir and exhausters, the respective exhausters of both bellows joined with a hinged bar or rod, passing beneath the action and connected with the pedal-levers and pedals, for combined operation by the same pedal movement, substantially as set forth.

2. In combination as described, with the supporting-case H adapted for attachment to the piano-body, and having the pneumatic-chest F, the motor-chest L, and the reed-board wind-chest arranged therein; of the two stationary body-boards B^3 and C^3 supported in approximately upright or slightly oblique positions within said case between the pneumatic-chest and motor-chest, the exhausters B′ and C′ hinged to said boards at their upper edges, their movable edges connected with each other for united operation, and with the pedals, by the jointed links or rods *e* which pass beneath the case, as set forth.

3. In a combination-piano mechanism provided with pneumatic-action-operating devices, and a reed-organ attachment; the combination, as described, of a plurality of independently-exhausting, connectedly-operated bellows that separately induce air-currents for said action-operating devices and the reed-organ attachment, means consisting of an external free-air inlet having an opening-valve, for relieving the reed-exhaust bellows from labor while operating when the reeds are out of operation, and a closing device for said valve, operated by the organ-stop, substantially as set forth.

4. In an automatic combination-piano, the combination of two sets of bellows respectively adapted as described, one for furnishing wind for the operation of the automatic actuating mechanism, the other for inducing a separate air current for sounding the reeds, the exhausters in both said sets of bellows connected with the same pedals for simultaneous operation; a free-air inlet for the reed-sounding bellows, and means, operating in conjunction with the reed-stopping mute, whereby said free-air inlet is closed when the mute is open, and allowed to open when the mute is closed, for the purpose set forth.

5. In an automatic combination-piano, the combination, substantially as described, of the pneumatic-actuating mechanism, the bellows therefor, the reed-board with reeds and mutes, the wind-chest for said reeds provided with the free-air inlet, the inlet stop-valve controlling said inlet, a second bellows for exhausting said wind-chest, the mute for controlling the reed-sound, the stop-pull connected or linked to said mute, and the rocker-shaft also connected with said pull and having a finger for closing said inlet stop-valve when the mute is opened.

6. In a combination-piano having two sets of bellows respectively adapted for furnishing wind for working the pneumatic-action, and a separately-induced current for sound-

ing the reeds, and simultaneously operated; the combination with said bellows, of a windway connecting the compartments of the two bellows, a normally-closed windway stop-valve, and means actuated by the movement of the movable back of the bellows-reservoir for automatically lifting said stop-valve and opening said windway when the effective strength of the reed-sounding bellows becomes weakened.

7. The combination, with the high-tension bellows adapted for exhausting the pneumatic and motor wind-chests, and the low-tension bellows adapted for exhausting the reed wind-chest; of the windway connecting the two exhaust-compartments, a stop-valve for said windway, an arm, connection and tilt-lever for opening said valve, and a reciprocating actuating bar or slide connected with the movable reservoir-back in said low-tension bellows, and having an incline for engaging the tilt-lever and effecting the opening of said windway-valve when said reservoir becomes unduly expanded, and permitting the valve to close when the reservoir is compressed, substantially as set forth.

8. The guard-valve Y operating in conjunction with the inlet stop-valve, in combination with the wind-chest having the free-air inlet and inlet stop-valve, the dual bellows having a windway connecting the two sets of bellows, and the automatically-actuated valve V in said windway, for the purpose set forth.

9. The combination, with the horizontal piano-frame, strings, piano-action and manual-keys in a grand piano; of the pneumatic-chest containing the controlling and operating pneumatics, with lift-puppets I, the tracker G and music-sheet-winding rolls, the bellows at the back of said chest, the wind-chest L and motor M at the back of the bellows, the wind-trunk L′ connecting said motor-chest and pneumatic-chest with the bellows-reservoir inlet *b*, the music-driving belts *n* and shaft *n′*, the pitman-pins from said puppets to the manual-keys, the pedals E, and pedal-rods connected with said bellows beneath the case, all substantially as shown and described.

10. The combination, with the pneumatic-chest containing the controlling and the operating pneumatics, and the lifting-puppets actuated by said pneumatics, having heads that afford a step for two pins, of the direct pitman-pins impinging upon the under side of the manual-keys, the adjacent pitman-pins impinging on the rocker-wires, the rocker-wires extending over the bellows, the reed-board with reeds and reed-duct valves, the valve-pitmen engaging with said rocker-wires, the reed-sounding bellows, the pneumatic-supply bellows, and the pedal mechanism having rods that pass beneath the case and respectively connect with the exhausters of both sets of bellows, substantially as set forth.

Witness my hand this 3d day of March, 1897.

WM. D. PARKER.

Witnesses:
C. L. PIERCE,
A. G. KUHULE.