

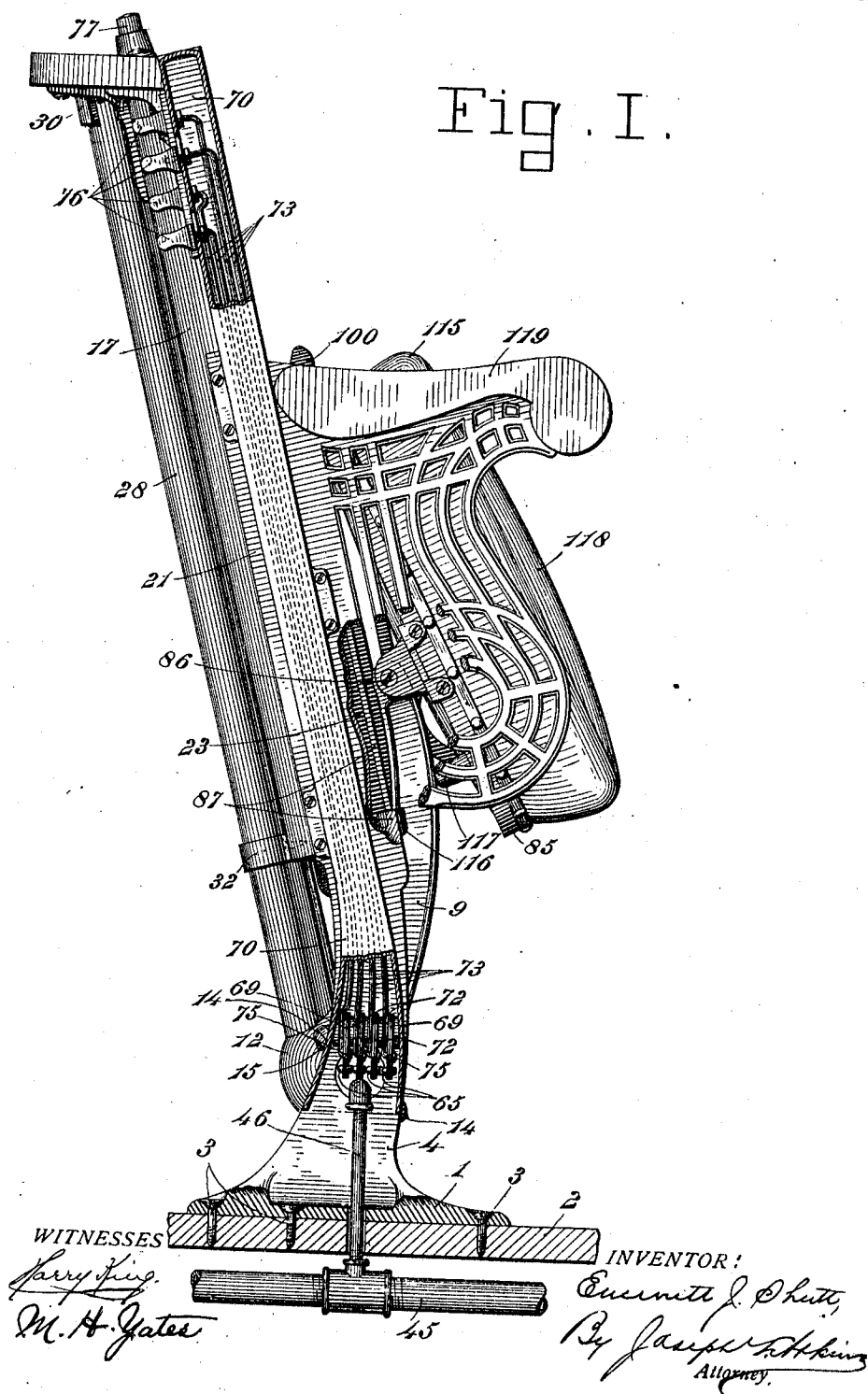
E. J. SHUTT.
 OPERA CHAIR AND MEANS OF OPERATING THE SAME.
 APPLICATION FILED MAR. 21, 1908.

988,515.

Patented Apr. 4, 1911.

7 SHEETS—SHEET 1.

Fig. I.



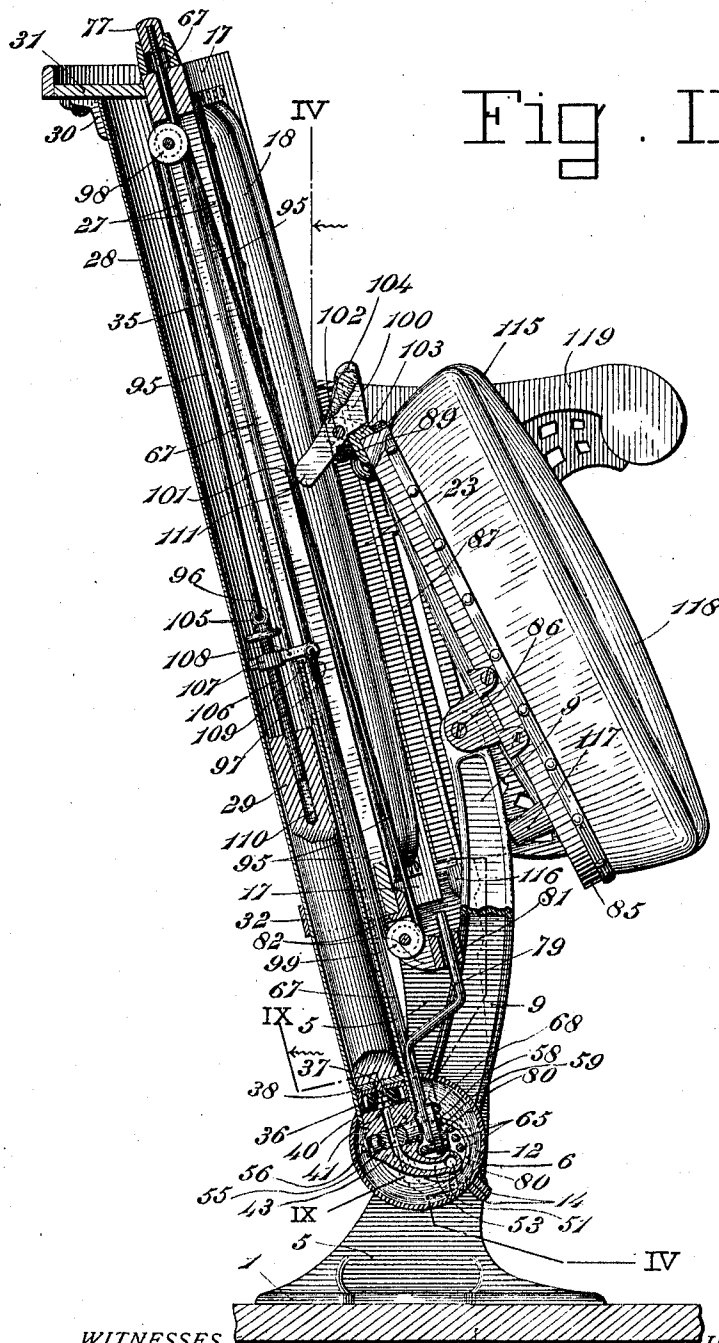
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7 SHEETS—SHEET 2.

Fig. II.



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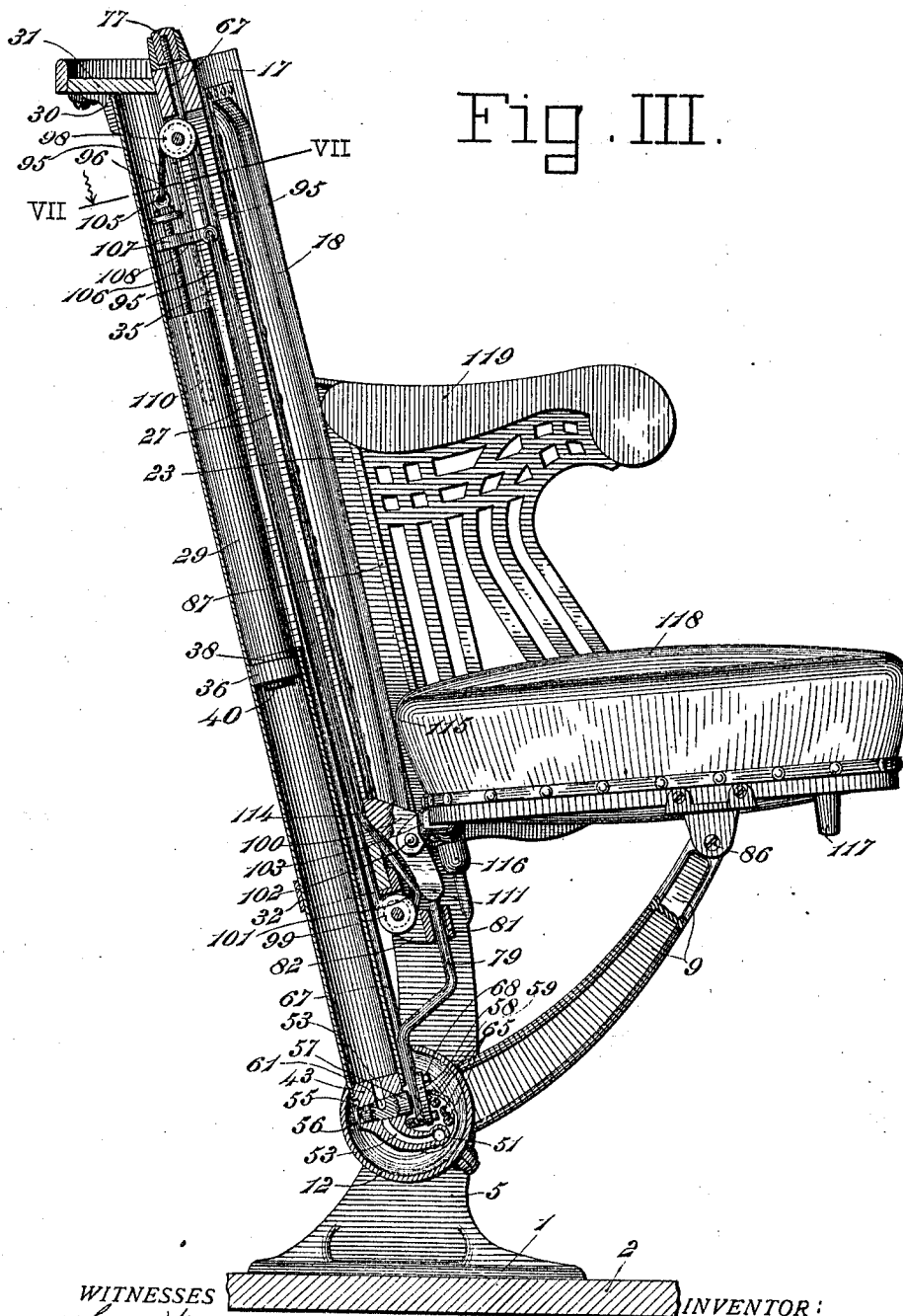
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7 SHEETS—SHEET 3.

Fig. III.



WITNESSES

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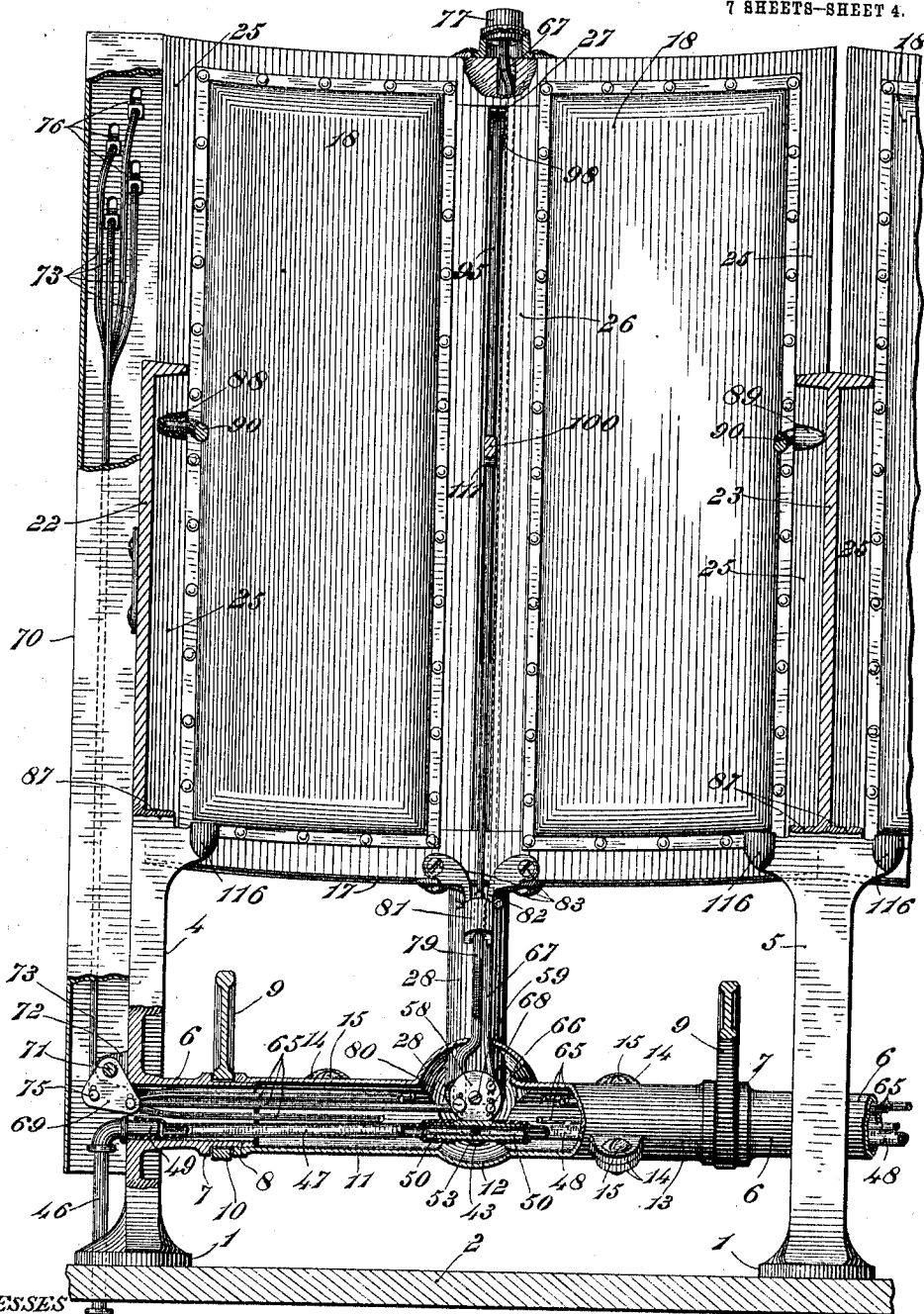
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7 SHEETS-SHEET 4.



WITNESSES

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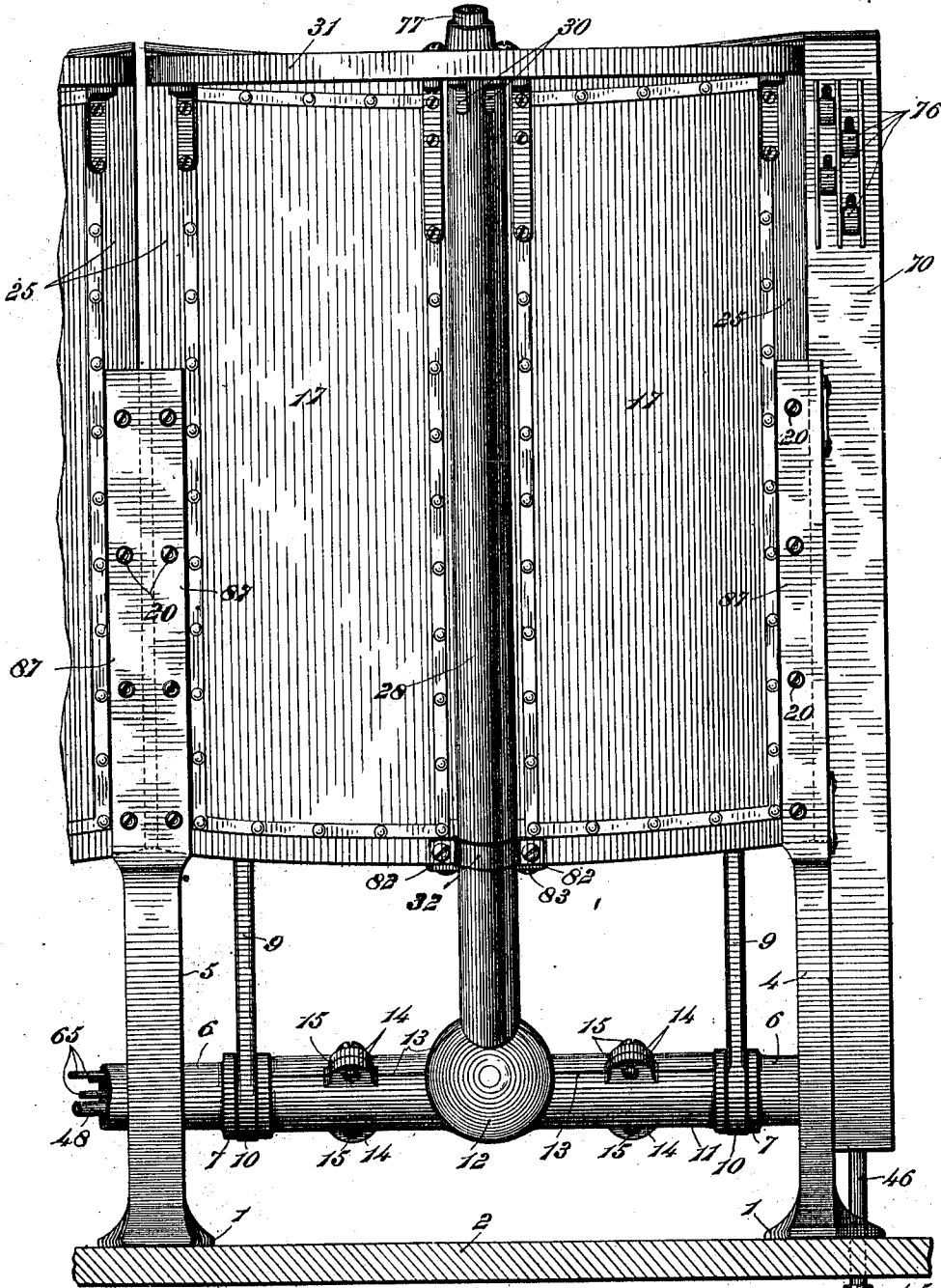
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7 SHEETS—SHEET 5.



WITNESSES

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Fig. V.

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7 SHEETS—SHEET 6.

Fig. VI.

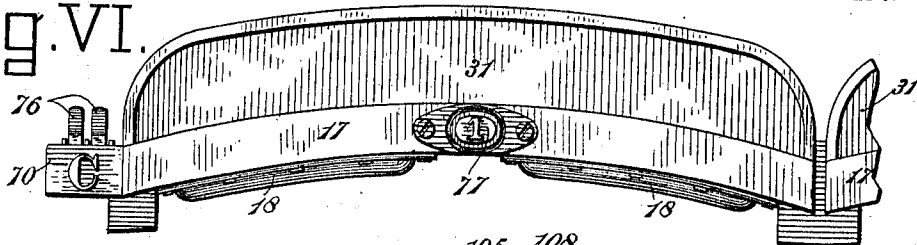


Fig. VII.

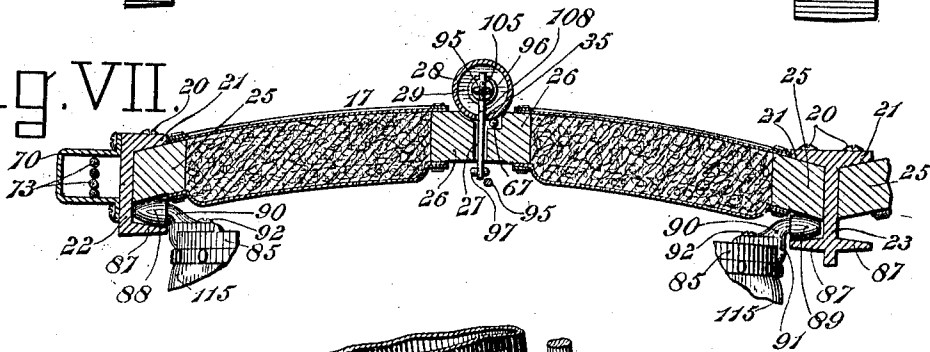


Fig. VIII.

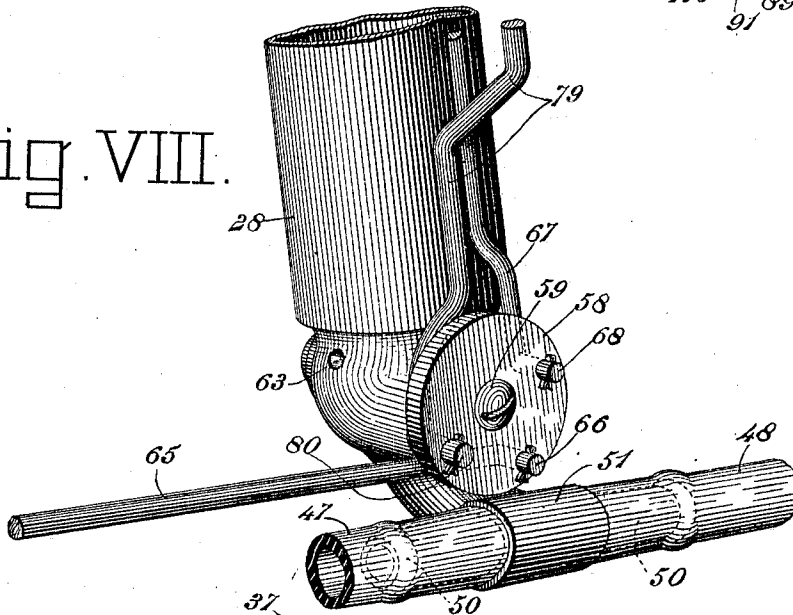
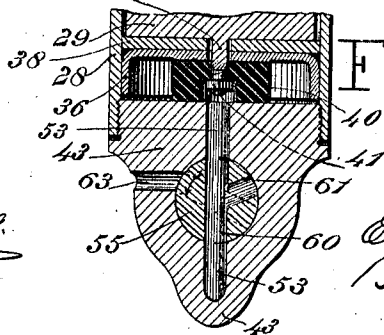


Fig. IX.



WITNESSES

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 APPLICATION FILED MAR. 21, 1908.

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7 SHEETS—SHEET 7.

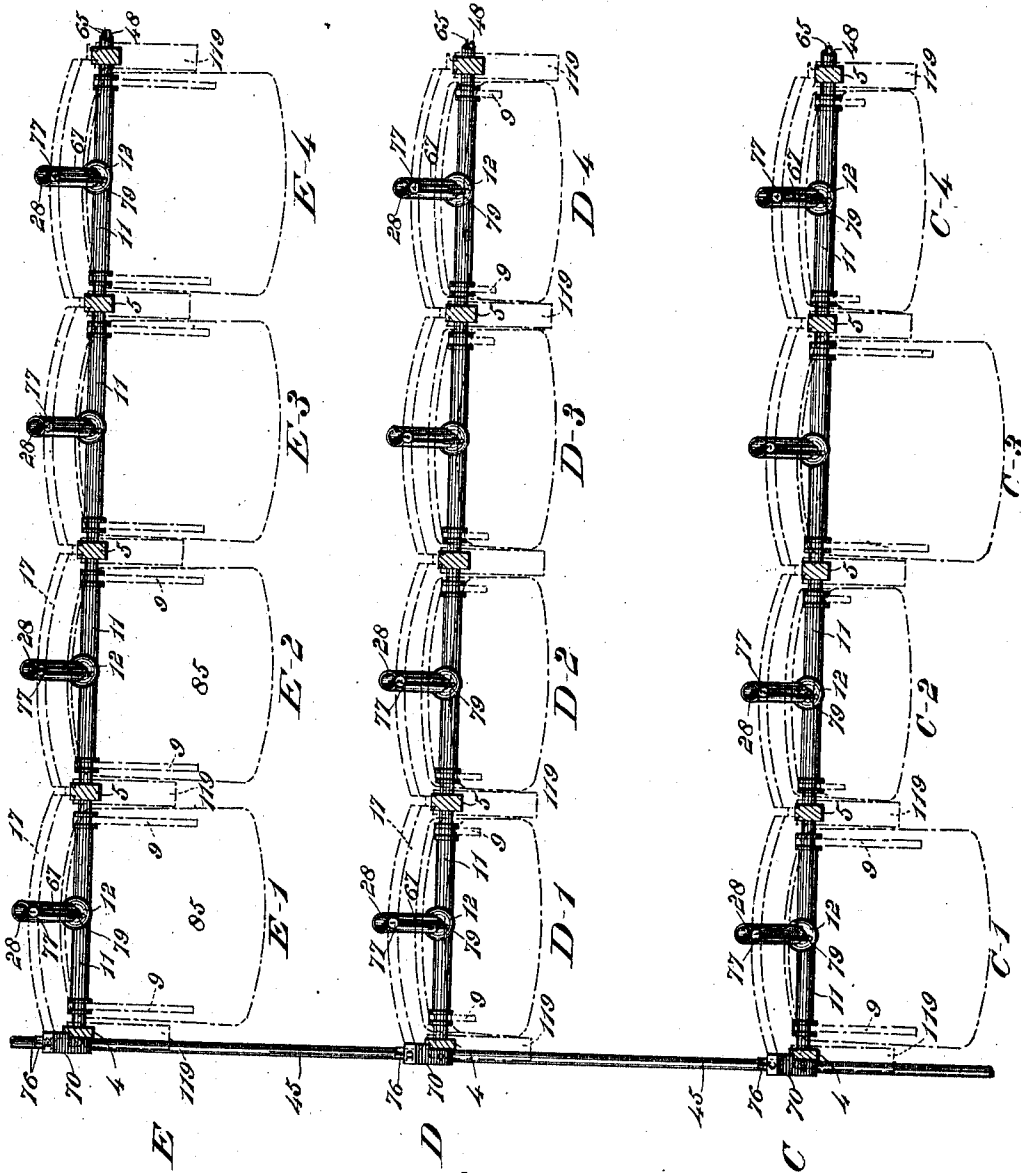


Fig. X.

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UNITED STATES PATENT OFFICE.

EMMETT J. SHUTT, OF ROCHESTER, NEW YORK.

OPERA-CHAIR AND MEANS OF OPERATING THE SAME.

988,515.

Specification of Letters Patent.

Patented Apr. 4, 1911.

Original application filed April 18, 1904, Serial No. 203,694. Divided and this application filed March 21, 1908. Serial No. 422,486.

To all whom it may concern:

Be it known that I, EMMETT J. SHUTT, of Rochester, in the county of Monroe, State of New York, have invented certain new and useful Improvements in Opera-Chairs and Means of Operating the Same, of which the following is a specification.

My present invention, relating to improvements in opera chairs and means for operating the same, is divisional of my application for United States Letters Patent Ser. No. 203,694, filed April 18, 1904.

The object of my invention is to provide means for accommodating a concourse of people in any place where a number of individuals are congregated, as, for example, a theater, opera house, church, school house, or other place of public resort, whereby, on the one hand, the seating of individuals is facilitated, and whereby, on the other, the spaces between adjacent rows of chairs may be instantaneously, with certainty, and preferably by automatic means, converted into cross aisles, by removal of the obstructions therein ordinarily interposed by the projection into said spaces of the seats of the chairs.

By my invention, means are provided whereby the chair or chairs corresponding to the number or numbers controlled by a ticket holder may be, by an attendant from the aisle, indicated and prepared for occupancy with precision and accuracy but without noise or confusion of any kind; whereby also the seat of any individual chair may be operated in place, that is to say in the place where the chair is located, to set it in position for occupancy, and may be as readily, preferably by automatic means, removed out of the way in order to permit unobstructed, free passage between adjacent rows of chairs; and whereby, upon occasion, any number of chair seats, to the limit of the full complement of chairs in a house, may be removed out of the way, either automatically, as it is done by preference, or through manipulation applied at a point or points remote from the seats themselves or any of them.

I regard my individual chair as specially adapted for the accomplishment of the various objects of my invention, as above set forth in general terms, and, therefore, present it as representing a preferred type of chair for the purpose specified above.

In order to enable one skilled in the art to fully comprehend the object and scope of my present invention, let it be taken into consideration that all large audience halls are divided into wide main aisles, between which chairs, for the seating of the audience, are arranged in rows, each chair being securely fixed in position in the row which it occupies. Each row of chairs defines, with a row next adjacent and parallel to it, a transverse aisle which communicates at one end, and generally at both ends, with the main aisles. Ingress to or egress from any intermediate chair in a row is obtained through the cross aisle defined, as above specified, between adjacent rows of chairs. The width of the cross aisles is necessarily limited in order to fully utilize the seating capacity of a hall. The cross aisles are consequently much narrower than the main aisles, but if unobstructed by the presence of the chair seats, are wide enough to afford as free ingress and egress for the limited number of occupants of a row as the main aisles themselves. If, therefore, provision, which may be depended upon, be made for removing the seats of all the chairs unobstructively out of the way, except at such time as they are actually occupied, such provision will suffice to keep the transverse aisles open, and to facilitate and expedite the emptying of the house in case of panic. Such provision looking to the safety of an audience or concourse of people it is one of the chief objects of my invention to make. Let it be observed in this connection that it is essential to the accomplishment of the object under consideration that the provision must include means of operating all of the seats in a house, and that the failure of a few seats here and there must entirely defeat the purpose in view, or, in a panic, a single obstructively disposed seat may prove the occasion of a blockade and consequent disaster. It is for this reason that the provision ordinarily made in opera chairs for holding the seat out of the way when it has been lifted may be, and in practice is, ineffectual as a means of facilitating the emptying of a crowded house, because the lifting of each seat depends upon an individual act, and because the failure to lift a single seat, or its accidental displacement after having once been raised, may serve to block a cross aisle. On the other hand, by my invention, the ob-

structive portion, or seat proper, of every chair in the house may be instantly and positively cleared away, automatically as by the rising of the audience to its feet, or by the manipulation of one or more attendants properly drilled and stationed advantageously for the performance of the required office.

It may here be observed that the term "chair" as employed throughout this specification is used to designate an individual seating instrumentality as a whole, including as a subordinate member the seat proper or simply "seat," which term, wherever it is employed, is used to designate that portion of a chair which, projecting, in use, substantially at right angles from the upright chair support or back, is rendered, in accordance with the principle of my invention, movable, and preferably automatically movable, into a non-projecting or unobstructive position against said upright or back during such time as it is out of service, or not actually occupied.

What constitutes my invention, both in respect to details and general scope will more fully appear in the following specification, and is succinctly set forth in the appended claims.

In the accompanying drawings, which constitute a part of this specification, Figure I is a side elevation of a preferred form of embodiment of so much of my invention as enters into an individual chair, portions of the chair being broken away to illustrate otherwise obscured parts, the seat of the chair being shown in the unobstructive or closed position, and the chair being shown as supported in service upon a floor and in communication with pipes which afford operative connection with a source of pneumatic energy. Fig. II is a central, vertical section of the subject matter of Fig. I, the seat and other portions of the mechanism being shown wholly or partially in elevation. Fig. III is a view similar to Fig. II but showing the seat in the open or depressed position, which it takes when occupied or ready for occupancy. Fig. IV is a front elevation of an end chair, as shown in Fig. I, for example, and of a portion of the one next to it in series, the seats of the two chairs and appurtenant mechanism being cut away as along the section line IV—IV of Fig. II. Portions of the chair are broken away in order to afford illustration of otherwise obscured parts of the mechanism. Fig. V is a rear elevation, without deviation, of the subject matter of Fig. IV, the floor and the main air-supply pipe being shown in section. Fig. VI is a top plan view of the subject matter of Fig. IV, with the seat omitted. Fig. VII is a section on the line VII—VII of Fig. III, with the chair arms and portions of the seat omitted. Fig. VIII

is a detail perspective view of a seat-actuating cylinder, valve-shell, valve-actuating mechanism, and air-supply pipe, detached. Fig. IX is a sectional view illustrative of the seat-actuating piston and valve taken as upon the line IX—IX of Fig. II. Fig. X is a plan view of a number of my chairs co-operatively assembled and installed in accordance with the principle of my invention. This figure illustrates, diagrammatically, the main air-supply pipe communicating, respectively, with three branch supply-pipes, each branch supply pipe being in operative communication with its row of chairs. The chairs of each row are shown, with the exception of their seat-actuating cylinders that are in operative communication with the branch supply pipes, in dotted lines, the topmost row of seats being shown in the open position, the intermediate row of seats in the closed position, and the lowermost row of seats in part open and in part closed.

Referring to the numerals on the drawings, 1 indicates a pedestal or base, which may be of any suitable and preferred shape and dimensions, and which is designed and adapted to be secured fixedly to a floor 2, as by the aid of screws 3. The pedestal 1 represents the member which, in the chair structure, supports the chair and secures it to the floor. In the present preferred form of embodiment of my invention, each pedestal is provided with an upright, indicated by the numerals 4 and 5 in the drawings.

4 indicates a terminal upright and 5 an intermediate upright, the distinction being that each intermediate upright constitutes, for the sake of economy of space, a member common to two chairs, while the terminal upright is appropriated to but one chair and carries the controlling members of the seat-actuating mechanism for a plurality of chairs in row. The uprights 4 and 5, supported upon their respective pedestals, are presented as examples of any suitable means of installation of a chair upon the floor where it is installed, or to which it is secured in service.

In the preferred form of embodiment of my invention in which for each chair two uprights 4 and 5 or 5 are employed, I prefer to make the uprights of cast metal and to provide upon each upright one, or, in case of an intermediate upright, two cylindrical projections 6. Each projection is furnished with a shoulder 7 and a reduced terminal cylindrical projection 8, which affords a bearing to accommodate the rocking movement of seat-supporting members 9, whose lower ends are provided with collars 10 to fit the bearings 8. The bearings 8 project beyond the collars, as shown clearly in Fig. IV, to receive and support between and upon the oppositely extending projections 6 a casing 11. Each casing preferably consists of a sec-

tion of pipe (see Fig. V) that extends between each pair of seat-supporting members 9, and also affords protection to certain parts of the seat-actuating mechanism, the better to accommodate which each casing is provided with a spheroidal medial portion 12. Each casing is preferably formed of two halves, whose line of division is indicated by the reference numeral 13 in Fig. V of the drawings. Each half is provided upon each side with a pair of lugs 14. The lugs of each half register with one another, respectively, in service, and each pair of co-registering lugs is united as by a screw 15 passing through an aperture in one lug and threaded in an aperture in the adjacent lug. By this means a secure and effectual casing, affording convenience of access to its interior, is provided, and in addition thereto a member 20 which may, if desired, serve as a foot rest.

The uprights 4 and 5, or a pair of uprights 5, as the case may be, cooperate to support between them a back 17, which is preferably of the rigid, immovable order, as contradistinguished from movable backs that are constituted into seat-actuating members. Each back preferably consists of an oblong rectangular frame, as shown in Figs. IV and V for example, the same being preferably constituted of a skeleton frame of joinery, preferably provided with upholstered back panels 18.

Each upright extends a little more than half the height of the back to which it is secured, as by the aid of a series of screws 20 (compare Figs. V and VII), each upright being recessed for the reception of the back and provided with a flange 21 for accommodation of the screws 20. The uprights 4 have, of course, one flange 21 and an outer wall 22, while the uprights 5 have two flanges 21 and an intermediate wall 23 (see Fig. VII).

The rectangular shape of the back 17 is preferred because that shape affords accommodation for lateral parallel track-members 25, into which the screws 20 take, and a split mid-rib 26. The mid-rib is split to form a vertical slot 27, which extends substantially from top to bottom thereof. The mid-rib, if the back be made of joinery, is made of two parallel pieces of wood suitably joined at the top and bottom with the top and bottom cross rails of the back.

To the rear of the seat is secured an incasing guide-way 28 for the accommodation of the travel of the seat-actuating member 29 (compare Figs. II and III). The guide-way 28 may be secured in a fixed position by any suitable and preferred means, as, for example, lugs 30, screwed to the underside of the shelf 31 projecting rearwardly from the top of the back, and by a strap 32 screwed to the back and overlapping the guide-way, as clearly shown in Fig. V.

The guide-way 28 is, in the preferred form of embodiment of my invention illustrated, a cylinder fitted to the accommodation of the piston 29, which is the form of seat-actuating member which I at present prefer. The guide-way 28, which, on account of the preferred form of it illustrated, will be hereinafter, wherever it is intended to be indicated specifically, designated as the seat-actuating cylinder, is provided in its upper end and forward side, for the performance of its office, with a slot 35, which registers throughout its extent with the slot 27 in the back 17.

The member 29 is, as has been specified, in its preferred form of embodiment illustrated, a piston, and is of suitable longitudinal extent to enhance its weight, which performs an important function in the mechanism, as will hereinafter appear. It is made to fit loosely and to move without friction within the cylinder 28, and is provided at its lower end with a cup 36, preferably made of leather, that is secured to a reduced end 37 of the piston. The leather cup is relied upon to afford suitable packing to the piston, and to prevent its distortion I provide between it and the piston, upon the reduced end 37 of the latter, a washer 38 as of steel, which acts as a guide to the piston and a protector to the washer in their reciprocatory movements. In order to prevent the breaking down of the sides of the cup 36, I provide in it a buffer 40 as of rubber, the buffer, cup 36, and washer 38 being all secured to the reduced end 37 of the piston as by means of a countersunk nut 41 threaded to the reduced end 37.

The lower end of the cylinder 28 is plugged by a valve-shell 43, which receives impact of the buffer 40 with each complete downward reciprocation of the piston 29 (compare Figs. II and III).

It has been specified that the piston 29 is, in its generic aspect, a seat-actuating member. Without any restriction of the broader aspect in which it may be viewed, I now proceed to describe the means by which, in its specific preferred form of embodiment illustrated, it may be actuated, and will subsequently add a description of the preferred means by which it is operatively connected with the chair seat to actuate it. It is proper in this connection at the outset to premise that the seat-actuating member, in so far as it constitutes a piston and nothing more, may be driven in either direction, or in both directions, within its cylinder 28 by pneumatic energy. In other words, it is clear that the seat-actuating member 29 being specifically a piston working as such within the cylinder 28, may be positively driven upwardly in the cylinder by the introduction of air under pressure in the cylinder between the piston and the shell 43. If, on the other hand, rarefaction

of the air within the cylinder be substituted for air under pressure, the effect will be to positively drive the piston 29 downwardly through the cylinder. Consequently, it is
5 apparent that by adequate means of control of the pneumatic energy supplied to the interior of the cylinder 28, a positive driving effect upon the piston, to cause it to move in one direction or the other therein, may be
10 exerted. With this adequate view of the function and capacity of the piston 29, it may be inferred that the piston typifies and exemplifies fluid-operated means for counter-actively actuating the chair seat, a description of the connection between the chair
15 seat and the seat-actuating piston 29 being reserved for specification hereinafter.

Notwithstanding the fact that the piston 29 is susceptible of positive operation by
20 pneumatic energy in both directions of its movement, and that such a mode of operation is clearly within the purview of the principle of my invention and under certain conditions might become the preferred
25 method of operation, I specify my present preference to be in favor of the substitution for pneumatic energy of the force of gravity, for the actuation of the member 29 in one direction, that is to say, in its downward
30 movement. It is in consideration of the preferential utilization of the force of gravity last above specified that the member 29 is presented in the elongated form of embodiment illustrated in the drawings, since
35 by reason of such elongation a ponderosity sufficient to qualify it for the performance of its office, under actuation of the force of gravity, may be imparted to it.

Regarded as a ponderable piston, the member 29, working within the cylinder 28 having its end closed as by the valve-shell 43, will find its tendency to descend, by gravity, the cylinder 28 resisted by the presence of
40 an air cushion within the cylinder. This air cushion exemplifies means for arresting movement of the seat-actuating member, and may be made subject to control by the presence of a vent or controllable means of discharge of the air within the cylinder, as
45 hereinafter specified. It now becomes apparent that the seat-actuating member, in its ponderable form of embodiment, represents an automatic agency, which, as will presently be made to appear, suffices for automatic
50 actuation of the seat with which it is connected. By the addition to a ponderable seat-actuating member of the capacity of a piston, such seat-actuating member becomes not only an automatic agency for the purpose
60 above specified, but a controllable automatic agency. Also by the introduction of the additional force of pneumatic energy to counteract and overcome that of gravity in a seat-actuating member of the ponderable
65 piston type, the seat-actuating agency is

made reversible. That is to say, it is made to operate in one direction by the force of gravity, and may be operated in the opposite direction by the counteractive force of fluid energy. 70

The means which I prefer to employ for the application of pneumatic energy to counter-act the force of gravity operating upon the ponderable piston 29 comprehends a main air-supply pipe 45 (compare Figs. I, 75 IV, and X), which, communicating with a source of pneumatic energy, not illustrated, distributes pneumatic pressure through branch pipes 46 that are disposed to correspond with the rows of chairs, as shown
80 diagrammatically in Fig. X. Each branch pipe extends lengthwise of its appropriate row of chairs, with each of which it is brought into operative communication. It may communicate at opposite ends with
85 mains 45, or it may be plugged to one end and communicate at one end only with the main.

For convenience of assembling, each branch pipe 46 may be provided within the casing 11 of each chair with flexible sections 47 and 48. Of the sections 47 and 48, which may be made of rubber hose, the former is joined to a nipple 49 on the end of a portion of the branch pipe 46 that extends from
90 the main 45, at one end, and at the other is joined to a nipple 50 (see Fig. VIII) of which two project in opposite directions in the form of a T from the depending end 51 of the valve-shell 43. The sections 47 and
95 48 connect oppositely projecting nipples 50 of adjacent valve-chambers. By the employment of the flexible sections 47 and 48, a continuous branch pipe is provided, and the fitting of the chairs into operative communication with the branch pipes is much
100 facilitated. The utilization of flexible sections in the branch pipe 46 is, however, merely a matter of practical convenience, which may be departed from at pleasure. 110

The bore of the nipples 50 communicates with the interior of the cylinder 28 by way of a passage 53 formed in the valve-shell, as clearly shown in Figs. II and III. Through this passage pneumatic energy developed by compression or rarefaction of
115 air in the main 45 and branch pipes 46 may be operatively communicated to the piston 29 working within the cylinder 28, compressed air being the power contemplated in the form of embodiment of my invention
120 illustrated in the drawings.

For the control of the pneumatic energy supplied to the interior of the cylinder 29, I provide a three-way plug valve 55, preferably tapered and fitted within a bearing provided for it within the shell 43 across
125 the passage 53. The valve 55 being secured at one end as by a screw-and-washer connection 56, is provided at its opposite end 130

with a projecting stem 57 to which is secured a disk 58, as by means of a screw 59 threaded co-axially to the stem 57. The valve 55 is provided, in effect, with a three-way bore 60, as clearly shown in Fig. IX, the flared end 61 of the bore being the equivalent of a Y-shaped branch therein. The bore 60, when the valve 55 is turned to the position shown in Fig. IX, registers with the passage 53, and constitutes a continuation thereof through the valve. When the valve is turned to the position shown in dotted lines in Fig. IX, the valve closes the passage 53 below it and establishes communication above it between that portion of the passage 53 that communicates with the interior of the cylinder 28 and a vent 63 to the atmosphere.

The valve 55 constitutes an example of mechanism for arresting movement of the seat-actuating member or piston 29, and may be turned to oppose an air cushion to positively resist and prevent the descent of the piston 29, or by communication with the vent 63 to control the speed of descent of the piston 29 in the cylinder. Moreover, when the valve is set in the position shown in Figs. II and IX, for example, it serves to supply pneumatic energy to counteract and overcome the force of gravity operating upon the piston 29, and, reversing the movement of the piston, to drive it upwardly against the force of gravity if desired.

The valve 55 of each valve-shell 43 is provided with its proper disk 58, by means whereof the valve may be rotated.

The valve-actuating instrumentalities which I prefer to employ in connection with the several valves 55 comprehend a plurality of mechanical members operatively connected with the disks 58, respectively. Three such members are sufficient to accomplish the several movements of the plug contemplated in the form of embodiment of my invention illustrated. In respect to their connection with the disk 58, they are well illustrated in Fig. VIII of the drawings, wherein 65 indicates the distance-actuating rod, that is to say, the rod by which the disk 58 is subjected to operative manipulation applied at a distance from the point of installation of a chair. The rod 65 is bent to afford a pivotal connection, as indicated at 66, with the disk.

67 indicates a rod pivotally connected, as indicated at 68, with the disk, and which is designed to actuate the disk in place, that is to say, by an operator within reach of the chair. The rod 65, whatever be the position of the disk 58 which it occupies in a row of chairs, leads through a casing or a plurality of casings 11, to a terminal upright 4, where (compare Figs. I and IV) it is operatively connected with a bell-crank lever 69, provided for it within the housing 70 on the

outside of the upright 4. Each bell-crank lever 69, of which a sufficient number is provided to operate as many chairs in a row as may be desired, is pivotally mounted, as indicated at 71, upon lugs 72 projecting into the housing 70 from the outside of the upright 4. It may here be observed that it is considered desirable to render one half of the number of seats in a row subject to distance-control from one end of the row, and the other half subject to like control from the other end of the row, the number of chairs between the main aisles in a row being limited either by custom and convenience, or by law, as is the case in many places.

Each lever 69 has its appropriate distance-control rod 73, which, being pivotally connected, as indicated at 75, to the lever, leads upwardly through the housing 70 to a handle 76 provided for it on the back of the housing.

In Figs. I and IV, and also in Fig. V, four rods 73 with their appropriate handles 76 are shown. It is deemed unnecessary to distinctively specify the several rods 73, their handles 76, and the rods 65 with which they respectively communicate. On the contrary, it is deemed to be conducive to clearness to specify only that each rod 65 has appropriated to it a disk 58, which it operates, and a handle 76, by which, through a rod 73 and a lever 69 connected with it, it may be actuated. It will, therefore, be understood that of the four handles 76, shown, for instance, in Fig. I of the drawings, one is controllably connected with one disk 58, another with another disk, and so on throughout the series. In practice, each chair has, as usual, a letter or number as the case may be appropriated to it, and the handle 76 connected with the particular chair would have displayed upon it a letter or numeral corresponding to the chair controlled by it.

Reverting to the rod 67 already specified, it will appear upon reference to Figs. II, III, and IV, for example, that that rod extends to the top of its chair, and there terminates in a push-button 77, by depression of which a partial rotation may be imparted to the disk 58, and through it to the valve 55 which it actuates. Let it be observed in this connection that each disk 58 is subjected to manipulative control by either of the two rods 65—67, and that any movement communicated by one rod to the disk 58 is reflected in the movement of the other rod. Conversely, the re-setting into operative position of both of the rods 65 and 67 follows upon any movement of the disk 58 calculated to produce the effect in question. Considering that the operative effect of either the rod 65 or the rod 67 is to turn the disk 58 in a position to bring the bore 60 of the valve to register with the passage 53 of

the valve-shell, that is to say in other words, to drive the piston 29 upwardly against the force of gravity, the re-setting of the disk 58 last above referred to is designed to bring the valve into the position shown in Fig. III, or in dotted lines in Fig. IX. In that position, the valve cuts off pneumatic energy from the interior of the cylinder 28, and establishing communication between the interior of the cylinder and the vent 63, permits the piston 29 to descend by force of gravity. It follows, therefore, that whenever the disk 58 is re-set in the manner described, it makes provision at one and the same time for the descent of the piston 29, and for a new manipulation of either the rod 65 or the rod 67, as occasion may require.

For reasons and in the manner which will be presently made to appear, I prefer to render the re-setting of each disk 58 automatic, and toward that end provide automatic valve-actuating mechanism, which comprises a rod 79 pivotally connected with the disk 58, as indicated at 80, and whose upper end reciprocates in a vertical sleeve 81 provided for it in the end of a pendent bracket 82 secured, as by screws 83, to the lower edge of the back 17.

It is now in order to explain the connection between the seat-actuating member or piston 29 and the seat, whose frame is indicated in the drawings by the reference numeral 85. Hitherto, it has been assumed to be a fact that the piston 29 is operatively connected with the seat. The means of connection employed will now be specified, and the manner of operation of the mechanism as a whole and the reasons therefor made to appear.

The seat-frame 85 is preferably sustained by the seat-supporting members 9, previously indicated, which are disposed upon opposite ends of each casing 11, and are pivotally connected, as indicated at 86, to the opposite sides, respectively, of the seat-frame. The members 9 are obliquely disposed to the seat-frame 85 when the latter is in the horizontal position, as shown in Fig. III, being pivotally mounted as to their lower ends upon their cylindrical supports or bearings 8. The shape of the supporting members 9 and the means by which they operatively connect the seat-frame 85 to the chair proper, to permit the movement of the seat-frame to and fro between the positions shown in Figs. I and III, for example, may be varied at will, the mechanism shown and described being presented only as an example of preferred mechanism suitable to the purpose, and not materially different from mechanism of corresponding function shown in my pending application previously referred to.

The members 25 are denominated, as specified, track members, for the reason that

they are designed and adapted to co-act with flanges 87 upon the wall 22 or 23, as the case may be, of the uprights 4 and 5 for guide wheels 88 and 89 to travel upon them in the movements of the seat-frame between the two positions thereof illustrated in the Figs. I and III, respectively, under consideration. Each of the wheels 88—89 is rotatively mounted as upon a stud-bearing 90 projecting at right angles from a corner angle-piece 91 that fits a rearward corner angle of the seat-frame 85 and is secured to it, as by screws or rivets 92.

The seat-frame 85 being preferably made of metal and shaped true with the angle-pieces 91, accurately fitted and secured to it, the stud-bearings 90 of each frame being in co-axial alinement with each other, affords a solid and firm bearing for the wheels 88 and 89 whereby the seat-frame may be raised and lowered with mechanical accuracy of movement, and the seat-frame is thereby, and by the aid of the flanges 87 and the track members 25, rigidly secured to the back, which is a point of important consideration, particularly when the seat is in the open position shown in Fig. III. The flanges 87, with the track members 25, constitute, in the uprights, slot-boxes for the wheels 88 and 89 to travel in.

In consequence of the coöperation of the seat-frame, seat-supporting members, and wheels 88 and 89 working in their slot-boxes, the seat is rendered retro-active, that is to say, its movement from the position shown in Fig. III to that shown in Fig. I, for example, is a retro-active movement. This is an important feature for the reason that by such movement a seat in operation from the open position shown in Fig. III to the closed position shown in Fig. I retreats from the body of a person standing in front of it or arising from it, and is in consequence in nowise impeded by contact with such body.

As has been specified, operative connection is made between the seat-frame 85 and the seat-actuating member 29. If this connection were direct, as it might be and as it is shown to be in my pending application above referred to, the result would be that upward travel of the piston 29 in the cylinder 28 would close the seat to the position shown in Fig. I, and the travel of the piston in the opposite direction would open it to the position shown in Fig. III. In order, however, to render the seat closable automatically and with the greatest certainty in every instance, I prefer to make the movement of the seat to the closed position, as shown in Fig. II, dependent upon the downward movement of the member 29, which, in the preferred form of embodiment of my invention illustrated, is the movement produced by operation of the force of gravity, a constant force and most reliable in its op-

eration. Accordingly, I provide a flexible member 95, whose opposite ends 96 and 97, respectively, are connected, and preferably adjustably connected, to the ponderable piston, or seat-actuating member, 29. The flexible member 95 passes around guide-pulleys 98 and 99, the former mounted in the slot 27 in the mid-rib (compare Figs. II, III, IV, and VII) adjacent to its upper end, and the latter below and in vertical alignment therewith, being supported in suitable bearings provided for it in the pendent bracket 82.

To the flexible member 95, which works through the slot 27, the seat-frame 85 is secured. The means employed for uniting the member 95 to the seat-frame is preferably a rocker 100 that is secured, as indicated at 101, to the member 95, and is pivotally united, as indicated at 102, to a bracket 103 fixed to the rear of the seat-frame 85. The movement of the rocker upon its pivot 102 permits the seat to move freely from one position to another. At the same time the rocker being provided with a grooved nose 104, operates as a keeper to press the flexible member 95 back into the slot 27 when the seat is open and ready for occupancy, as clearly illustrated in Fig. III. Without limiting myself to the means illustrated for operatively uniting the seat to its actuating-member 29, or to the means for keeping the flexible-member within the slot when such member is employed, I present the mechanism illustrated as constituting the present preferred form of embodiment of my invention in respect to the parts under consideration.

The ends of the flexible member 95 being, by preference, adjustably united to the seat-actuating member 29, I prefer for that purpose to connect the end 96 with an eyelet 105 swiveled to the end of a screw-bolt 106, to which, as by the intervention of a threaded collar 107, the end 97 of the member 95 is secured, the collar 107 being preferably provided with a lug 108 having an eye 109 for the attachment to it of the end 97 of the member 95.

The screw-bolt 106 preferably screws into a threaded aperture 110 co-axially disposed in the upper end of the member 29, and so affords, through its rotative movement with respect to the collar 107, and the aperture 110, means not only for adjusting the length of the member 95 and keeping it taut about its pulleys 98 and 99, but also means for adjusting the position of the piston 29 with respect to its cylinder 28. The required adjustment is illustrated in Figs. II and III, in which the piston is shown at the limit of its downward movement against the valve-shell 43 when the seat is in the completely closed position (see Fig. II) and at the limit of its upward movement when the seat is in

its completely open position (see Fig. III). In the latter position, space must be provided for the accommodation of the end 96 of the member 95 and of the lug 109 well below the pulley 98 so as not to interfere with its operation.

The end of the rocker 100, contiguous to its union with the flexible member 95, is provided with a bumper 111, adapted to impinge against the end of the rod 79 that projects above its guide sleeve 81. The impingement of the bumper 111 against the end of the rod 79 occurs whenever the seat reaches its fully open position, as shown in Fig. III. This position is attained when the piston 29 reaches the upward limit of its movement, as shown in that figure, when it is affected either by the force of pneumatic energy driving the piston upwardly, or by depressing force applied from the outside against the seat. The effect of the impingement is to impart a partial rotation to the disk 58 and to set the valve 55 to the position shown in dotted lines in Fig. IX, thereby cutting off air pressure from the cylinder and establishing communication between the interior of the cylinder and its vent 63. At the same time the movement of the disk 58 resets the rods 65 and 67 in position for their manipulation to reapply pneumatic energy at will. It is proper to observe in this connection that by the employment of the gravity-controlled seat-actuating member 29 automatic closing operation of each seat, and all of them, is effected independently of the operation of the pneumatic system with which the seats are also in communication. Moreover, the valve 55 performs a function independently of its control of the positive pneumatic energy derived from said system. That function is two-fold, and may be explained as follows. In the absence of available pneumatic energy, as in the case of an interruption of its source of supply, any seat in a house equipped with my chairs may be brought to the open position by pressure applied against the top of the seat. This pressure may be brought to bear by the weight of a person applied to the upper corner 115 of the seat when in the position shown in Fig. IX, for example, the effect being that the seat will sink gently to the open position when in Fig. III, its rate of speed being controlled by the suction exerted by the piston 29 within the cylinder drawing air in through the vent 63. In this aspect, the vent becomes a speed regulator to the piston 29 in its upward movement as well as in its downward movement, it being observed that the normal position of the valve 55 is that in which the vent 63 communicates with the interior of the cylinder 28. Again, if the seat be brought to the open position by hand power applied to it and it be desired in the

absence of pneumatic energy to hold it in the open position temporarily, that may be accomplished by pressure applied to its push-button 77, the effect whereof will be to impart a partial rotation to its disk 58, and incidentally to close the vent 63, and by exclusion of air from the cylinder, to hold the seat in the open position. Observe that when pneumatic energy is available, any seat may be held in the open position by manipulation through an operator of either its button 77 or its appropriate handle 76.

Each seat is provided with stop-pieces 116, which project from an upright into the path of movement of the seat to limit its descent, but is preferably provided with rubber strikers 117, which impinge against the seat-supports 9, as shown in Fig. II, for preventing shock or noise when the seat comes to the closed position shown in that figure. In addition to these details, it may be mentioned the upholstered cushion 118, with which the seats are preferably provided, and the arms 119 are included, by preference, in the chair design.

Description of the operation of the various parts of my machine has been offered in the foregoing specification as occasion appeared to require in describing the constructions of the various parts, and to such description it appears to be necessary to add only the following. In Fig. X illustration of a section of a house completely equipped with my invention is presented. The main aisles are disposed parallel to the main and may be of any usual or preferred width. The line of the pipe 45 may be regarded as defining one side of a main aisle. From the main aisle proceed cross-aisles defined by rows of chairs occupying definite fixed positions, respectively, upon the floor. For the purpose of illustration, three rows of four chairs each are shown, the rows being indicated by the letters C, D, and E, respectively, the individual chairs in the rows being indicated as in practice by numerals. The chairs E-1, E-2, E-3, and E-4 are shown open in the position which they would assume if occupied. The chairs D-1, D-2, D-3, and D-4 are shown closed, while of the chairs in row C, C-1 and C-3 are shown open and C-2 and C-4 closed. One purpose of the illustrations afforded in Fig. X is to show the increase of space between rows afforded by the closing of the seats in row D as compared with the space occupied by the open seats in row E. Row D shows the normal position of the seats of chairs of the preferred type shown and described in this specification, it being that in which the seats assume the position shown in Figs. I and II of the drawings, and in which the cross-aisle defined between rows E and D is cleared of obstruction to the limit of its

width. This position all seats in the house automatically assume except at such time as they are actually occupied, or are subjected to pneumatic control through the manipulation of an operator. Row C shows the manner in which the seats may be selectively lowered and designated for occupancy, as by an operator standing at the end of the row within reach of the housing bearing the letter C in the figure of the drawings under consideration. In that position, upon presentation of a ticket indicating that the holder is entitled to a seat in row C, the operator manipulates the proper handle 76. Thereupon the seat to which the ticket holder is entitled sinks into the open position, and remains in that position until the occupant assumes it. Immediately upon the application to a seat of the weight of an occupant, the bumper 111 impinges against the rod 79 and operates the valve 55 to cut off air supply. Consequently, the seat is free to rise as soon as it is relieved of the weight of its occupant. If the occupant should arise from his seat for any purpose, as to let another person pass in front of him, no manipulation is necessary, but the weight of his body applied against the seat will suffice to depress it. On the other hand, he may, if he prefers, either for himself or for another, press the push-button 77 and cause the seat actuated thereby to assume and hold the open position until occupied.

It has already been specified that by the employment of gravity-controlled seat-actuating members 29 the closing of all the seats is effected automatically and by an agency the most certain and reliable of any that might be selected.

It has been specified to be within the purview of my invention to provide for the production of air pressure and air rarefaction within the mains 45. It is obvious from the foregoing specification that the result would be to positively open and close the seats by air pressure, either by aid of a gravity-actuated piston, or independently thereof and it will be apparent that with such provision it is practicable to positively actuate all the seats in an entire house in either or both directions of movement through manipulative control applied at a single point in the house, to the same effect as the closing of all the seats in the house is accomplished automatically by operative application of the force of gravity, as hereinbefore specified. In this connection, however, it is my purpose to make it clear that any pneumatically actuated system or gravity-actuated system is, in this application, intended to be only an exemplification of one of a number of instrumentalities controllable at a distance from its point of ultimate operation, and that I do not intend

to limit myself to any details of construction otherwise than within the scope of the principle of my invention and of the appended claims.

5 What I claim is:

1. As a means of minimizing the resultant dangers of panic in a place of assembly, the combination therein with a plurality of chairs provided with gravity-actuated seats and arranged therein in aisles and in cross-aisles defined between rows of said chairs, of fluid-operated means for counteractively actuating said seats, said seat actuating agencies coöperating to clear the cross-aisles
15 of obstruction.

2. The combination with a stationary chair, a seat movably secured thereto and yielding means for actuating said seat, of counteractive pneumatically-operated means
20 for actuating said seat, a valve controlling the air supply, means for actuating said valve, and automatic means insuring the opening of said valve.

3. In a chair, the combination with a
25 slotted guide-way, movable seat and support, of movable means within the guide-way, operatively connected through the slot with the seat.

4. In a chair, the combination with a
30 slotted guide-way, movable seat and support, of a yieldingly actuated seat-actuating member movable within the guide-way and operatively connected through its slot with the seat.

5. In an opera chair, the combination
35 with a slotted guide-way, movable seat-frame, and suitable means for supporting the same, of a back, means enabling the seat-frame to travel upon the back-frame to and
40 fro between the open and closed positions of the seat-frame, and means for opening and closing the seat-frame, said means being operatively located within the guide-way.

6. In an opera chair, the combination
45 with a slotted guide-way, movable seat-frame and means for supporting the seat-frame upon the chair, of a slotted back, means enabling the seat-frame to travel upon the back to and fro between the open
50 and closed positions of the seat-frame, and means for opening and closing the seat-frame, said means being operatively located within the guide-way and operatively connected with the seat-frame through the
55 slotted back.

7. In an opera chair, the combination
with a hollow slotted guide-way, movable seat, and movable seat-support, of a back provided with lateral track-members and a
60 slotted mid-rib communicating with the slot in the guide-way, wheels upon opposite sides of the seat-frame working upon the track-members, and means for opening and closing the seat-frame located within the bore of the
65 guide-way and operatively connected with

the seat-frame through the slot in the mid-rib.

8. In an opera chair, the combination with a hollow slotted guide-way and a back provided with a slotted mid-rib and lateral
70 track-members, of a movable seat-frame, movable seat-supporting means, wheels carried upon stud bearings secured to the opposite corners of the seat-frame, respectively, slot-boxes for operatively securing the
75 wheels with their bearings upon the track-members, and means for opening and closing the seat-frame located within the bore of the guide-way and operatively connected with the seat-frame through the slots in the
80 guide-way and mid-rib.

9. In an opera chair, the combination with a hollow slotted guide-way, a back provided with a slotted mid-rib and means of support therefor provided with slot-boxes,
85 of a movable seat-frame, movable seat-supports, wheels upon the opposite corners of the seat-frame, respectively, working in the slot-boxes, and means for opening and closing the seat-frame located within the bore
90 of the guide-way and operatively connected with the seat-frame through the slots in the guide-way and mid-rib.

10. In an opera chair, the combination with its slotted back, slotted guide-way, movable seat and seat-support, of a ponderable seat-actuating member in the guide-way, a flexible member operatively connected with the seat and having its opposite ends connected with the seat-actuating member, and
100 guide pulleys for the flexible member.

11. In an opera chair, the combination with its slotted back, slotted guide-way, movable seat and seat-support, of a ponderable seat-actuating member in the guide-
105 way, a flexible member operatively connected with the seat and having its opposite ends adjustably connected with the seat-actuating member, and guide pulleys for the flexible member.
110

12. In an opera chair, the combination with its slotted back, movable seat and seat support, of a seat-actuating member, a flexible member operatively connecting the seat with its actuating member through the slot,
115 guide-pulleys for the flexible member, and a rocker upon the seat working against the flexible member to force it into the slot when the seat is open.

13. In an opera chair, the combination
120 with its back, movable seat, seat-support, cylinder, and seat-actuating piston within the cylinder operatively connected with the seat, of a valve-shell in the end of the cylinder, a valve therein, and a plurality of
125 means for actuating the valve, one of the said means working automatically upon the opening of the seat.

14. In an opera chair, the combination with its back, movable seat, seat-support,
130

cylinder, and seat-actuating piston within the cylinder operatively connected with the seat, of a valve-shell in the end of the cylinder, a valve therein, and a plurality of
 5 means for actuating the valve, one of said means working automatically upon the opening of the seat, and adapted upon its operation to reset the other valve-operating means.

10 15. The combination with a row of opera chairs provided with piston-actuated seats, of means for operative supply of pneumatic energy to the respective pistons, a valve controlling the air supply to each piston, and
 15 means at the end of the row for actuating the respective valves.

16. The combination with a row of opera chairs provided with piston-actuated seats, of means for operative supply of pneumatic
 20 energy to the respective pistons, a valve controlling the air supply to each piston, means at the end of the row for actuating the respective valves, and also means upon

each chair for actuating the valve belonging to that chair.

25 17. The combination with a row of opera chairs provided with piston-actuated seats, valves, air supply pipe, and means for actuating the respective valves from the end of the row, of casings for the pipe, valves, and
 30 valve-actuating mechanism.

18. In an opera chair, the combination with a pair of uprights supporting a back, of opposite projections upon the uprights
 35 affording bearings for a seat-support, a seat-actuating piston, cylinder, an air supply-pipe communicating with the cylinder, and a casing for the air supply-pipe carried upon the projecting seat-support bearings.

In testimony whereof I have hereunto
 40 signed my name in the presence of two subscribing witnesses.

EMMETT J. SHUTT.

Witnesses:

ERWIN E. SHUTT,
 IDA A. ZIMMER.