(No Model.) 2 Sheets—Sheet 1.

W. B. MANN.

ELEVATING CHAIR.

No. 557,846. Patented Apr. 7, 1896.

Fig-1-

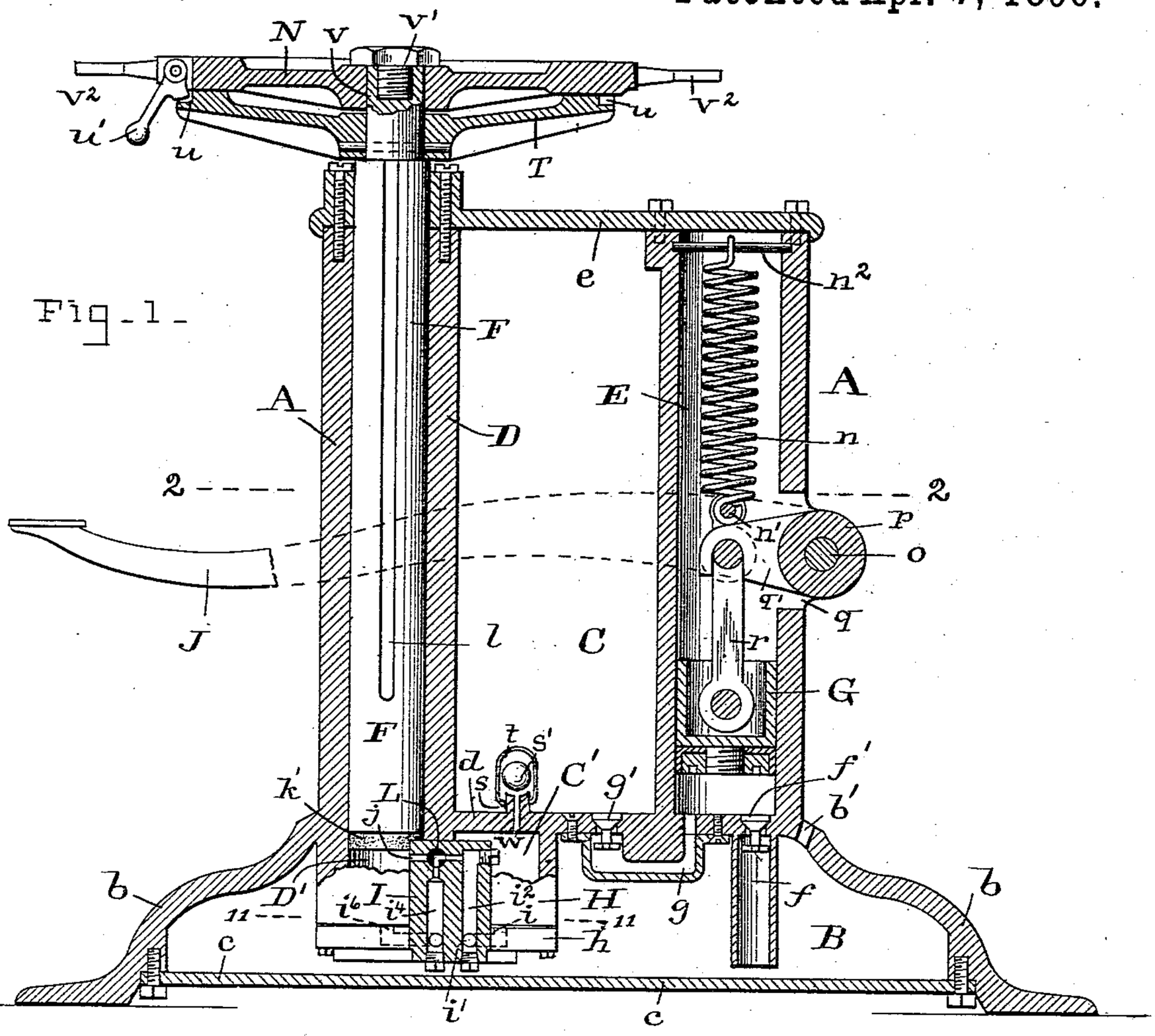
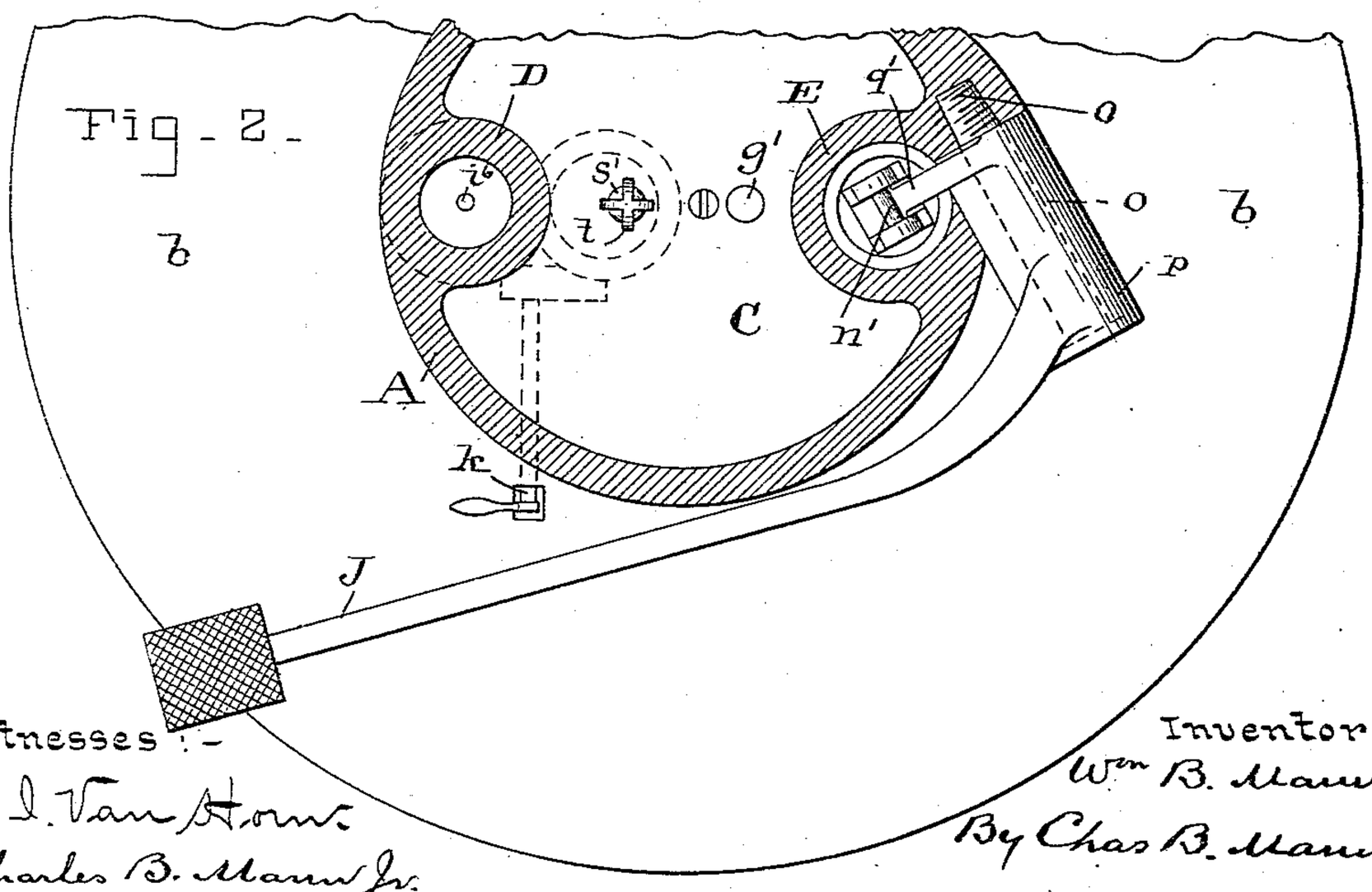


Fig-2-



witnesses :-
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Charles B. Mann Jr.

Inventor :-
Wm B. Mann
By Chas B. Mann
Attorney.

(No Model.) 2 Sheets—Sheet 2.

W. B. MANN.

ELEVATING CHAIR.

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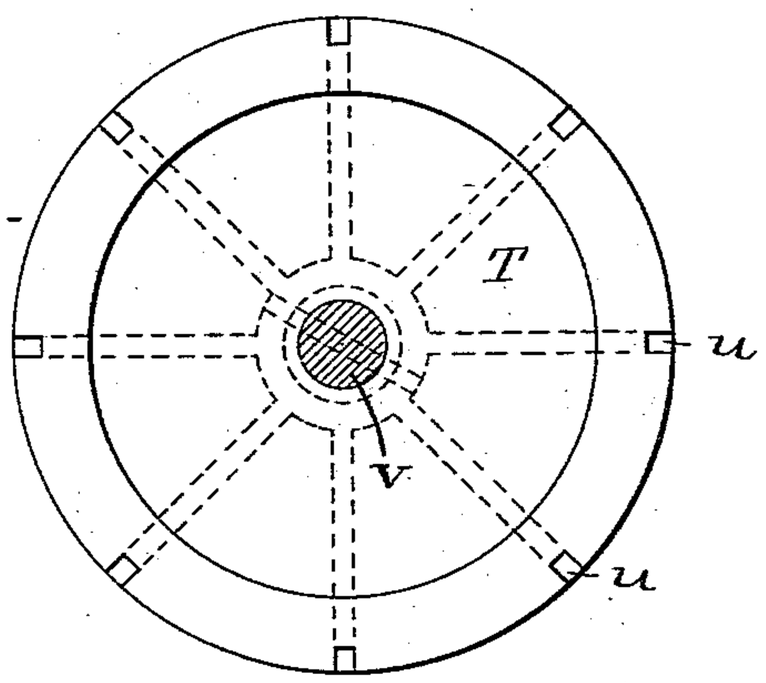
Fig. 3.



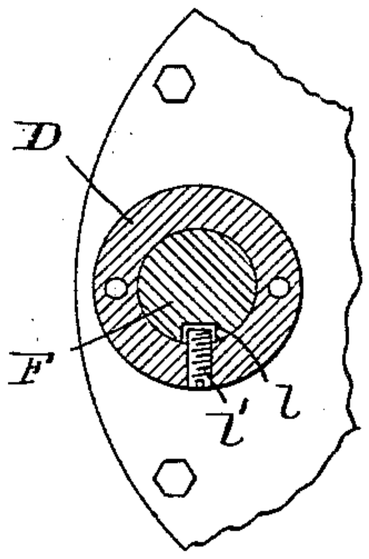


Fig. 4.

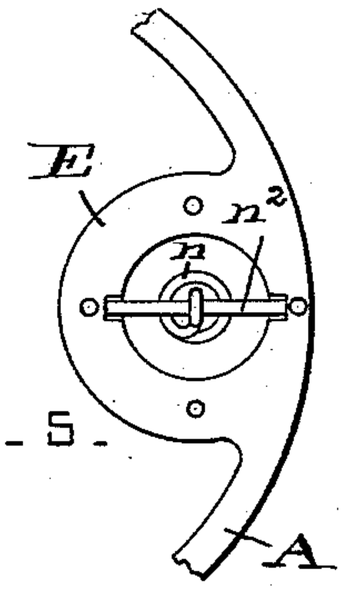


Fig. 5.

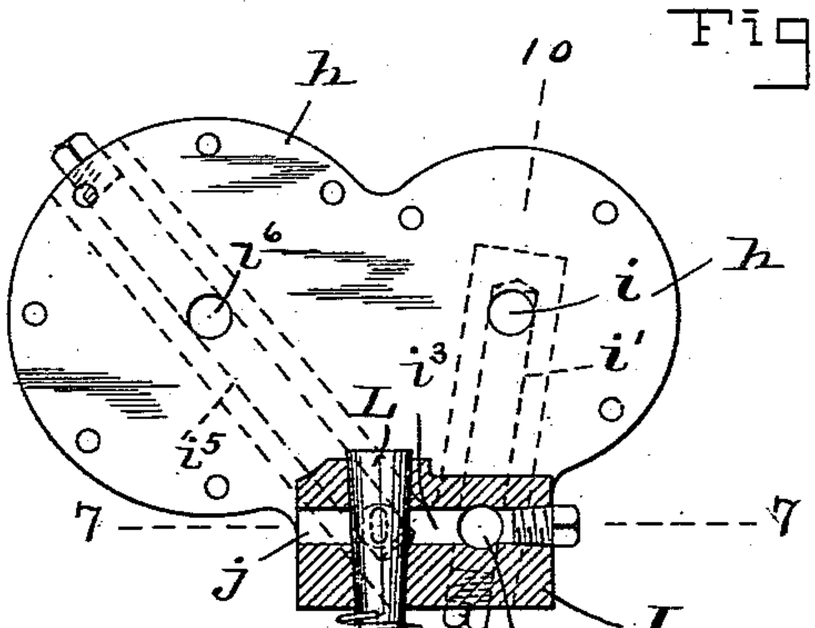


Fig. 6.

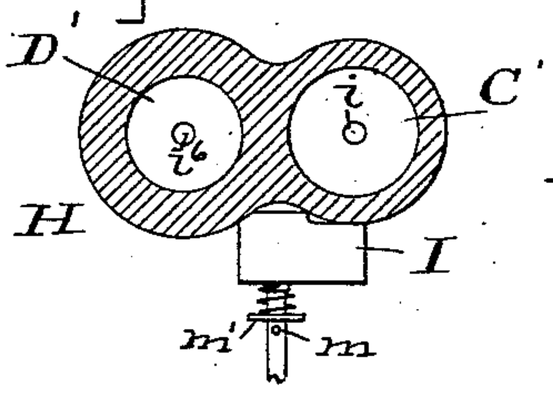


Fig. 11.

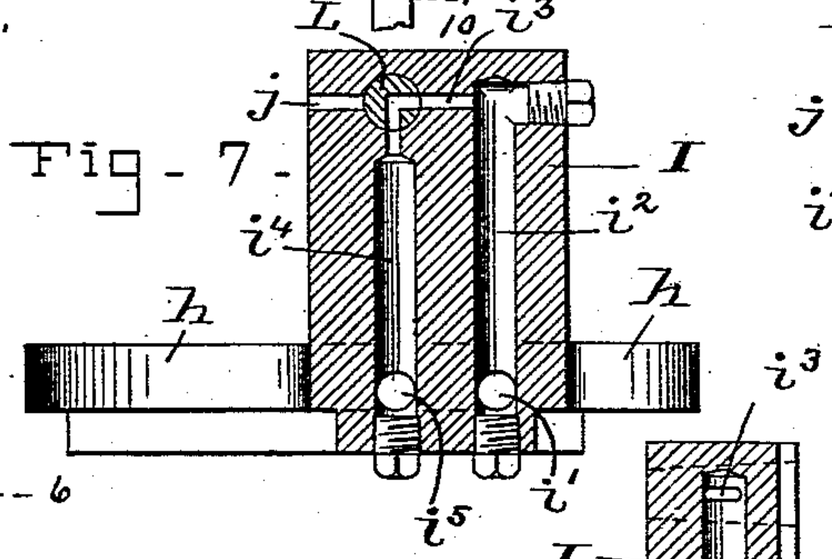


Fig. 7.

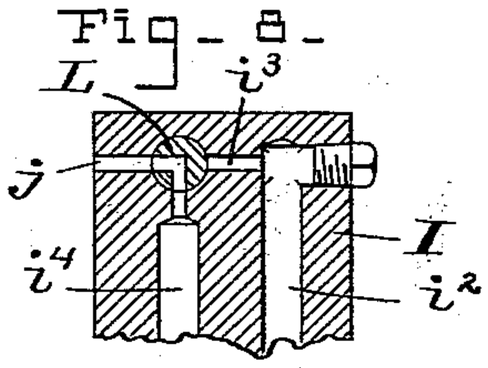


Fig. 8.

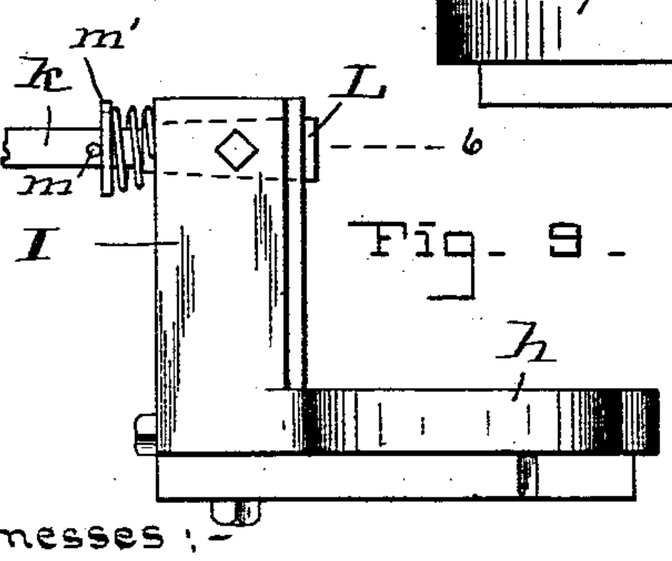


Fig. 9.

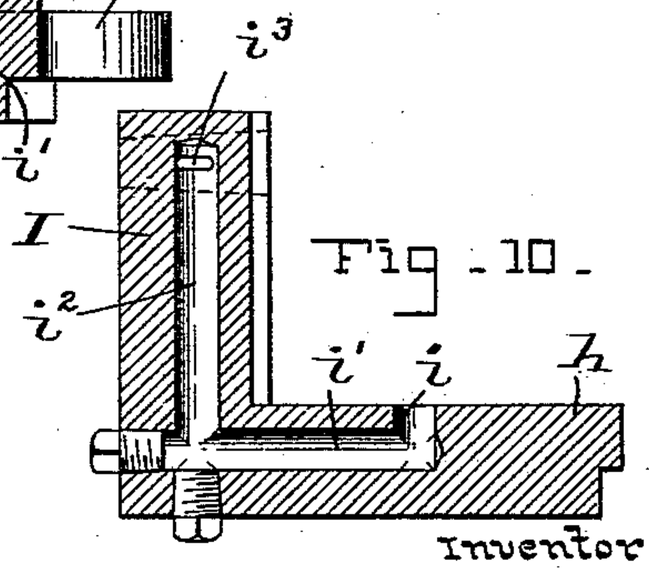


Fig. 10.

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UNITED STATES PATENT OFFICE.

WILLIAM B. MANN, OF BALTIMORE, MARYLAND.

ELEVATING-CHAIR.

SPECIFICATION forming part of Letters Patent No. 557,846, dated April 7, 1896.

Application filed September 29, 1894. Serial No. 524,473. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM B. MANN, a citizen of the United States, residing at Baltimore, in the State of Maryland, have invented certain new and useful Improvements in Elevating-Chairs, of which the following is a specification.

This invention relates to an improvement in chairs such as are used by dentists, and has for its object to provide within the base of such chairs means whereby a liquid, such as oil, is impelled by a fluid, such as compressed air, to elevate the chair-body without exertion on the part of the operator. I propose to so embody my invention and combine its parts that the chair-body will be elevated by the operator simply actuating a valve-handle in one direction, whereupon the action of the compressed air on the oil will raise the chair-body automatically, and I propose to have the chair lowered by the operator actuating said valve-handle in another direction.

In order to make the improvements in chairs more clearly understood, I have shown in the accompanying drawings certain constructions for carrying the same into practical effect, without, however, intending to limit my invention to the particular construction which, for the sake of illustration, I have set forth.

In the drawings illustrating the invention, Figure 1 is a diametrical vertical section of the base or pedestal of a chair, the head mounted on the plunger, and the rotary frame which carries the chair-seat; but the lower end of the plunger-cylinder is not in section, but is in side view, and the section of the governor-valve L and passages in the wall I are on a different vertical line from the other parts of the figure. Fig. 2 is a horizontal cross-section of the chair-base on the line 2 2. Fig. 3 is a top view of the head which is mounted on the plunger. Fig. 4 is a cross-section of the plunger and cylinder. Fig. 5 is a top view of the pump-cylinder, showing the manner of supporting the retracting-spring of the pump. Fig. 6 is a top or plan view of the bottom plate of the auxiliary oil-reservoir and a horizontal section of the governing-valve on line 6 6 of Fig. 9, showing the valve and oil-passages. Fig. 7 is an elevation of the bottom plate of the auxiliary oil-reservoir, and also a vertical section of the governing-valve and oil-passages on line 7 7 of Fig. 6, showing the valve open to admit oil from the pressure-cylinder to the plunger-cylinder for the purpose of raising the chair-body. Fig. 8 is a section view showing the valve in the position it takes when the oil is being exhausted from the plunger-cylinder into the oil-reservoir for the purpose of lowering the chair-body. Fig. 9 is a side elevation of the said bottom plate and vertical wall containing the oil-passages. Fig. 10 is a vertical section view of the same on line 10 10 of Fig. 6. Fig. 11 is a horizontal section view on line 11 11 of Fig. 1, showing the auxiliary oil-reservoir.

The base A, exteriorly, is cylindric in the present instance, and may be supported on feet or an annular rim *b*. It has a bottom plate *c*, which serves as the bottom of an oil-reservoir B, and a horizontal plate *d* above said bottom, which serves as the bottom of a pressure-chamber C. A top plate *e* serves as a cover and makes the pressure-chamber air-tight.

Two small cylinders D E are, in the present instance, in the base A. These may be formed or constructed in any desired manner. In the present instance they are formed with and as part of the casting of the cylindric base A. One cylinder, D, is for the plunger F, which supports the chair-seat, and the other cylinder, E, is for the pump-piston G. The pressure-cylinder C is to hold a fluid under pressure. In the present instance it is designed to hold both air and oil under pressure. It is obvious, however, that instead of one chamber to contain both oil and air, two separate chambers may be used, one for the oil and the other for the air, and a suitable communication between them, so that the compressed air may act on the oil and impel it.

A pendent pipe *f* is on the lower side of the horizontal plate *d* at the bottom of the pump-cylinder and projects down into the oil-reservoir B, and its lower end is open and is near the bottom of the reservoir. A check-valve *f'* is at the upper end of the pendent pipe to allow the oil to pass up into the pump-cylin-

der, and closes communication in the direction from the pump-cylinder E to the oil-reservoir. By means of the pendent pipe *f* the oil will be supplied to the pump-cylinder until the amount of oil in the reservoir B is so much reduced as to leave the open end of the pipe *f* exposed. When the piston G is raised, it sucks the oil up through the pipe *f*, and the check-valve *f'* opens to let the oil pass into the cylinder E and then closes to retain the oil. A passage *g* communicates from the bottom of the pump-cylinder E to the bottom of the pressure-chamber C, and a check-valve *g'* in this passage opens to allow the oil to pass into the pressure-chamber, but closes to prevent the return of oil therefrom.

Below the pressure-chamber C and plunger-cylinder D is a small auxiliary reservoir H, which has two separate compartments C' and D', one of which is open to the said chamber and the other to the cylinder above it. This auxiliary reservoir has a bottom plate *h* secured to it by bolts, and the plate is provided with a vertical wall I, which projects up alongside of the auxiliary reservoir. This bottom plate and its vertical wall are provided with passages leading from the auxiliary reservoir to the plunger-cylinder. The bottom plate in the compartment C' has an opening *i* to a horizontal passage *i'*, which leads to a vertical up-passage i^2 in the vertical wall I. A horizontal cross-passage i^3 leads from the top of this vertical up-passage to a vertical down-passage i^4, which connects with a horizontal passage i^5 in the bottom plate, and this last passage opens at i^6 into the compartment D' under the plunger-cylinder D, as shown in Fig. 1. A discharge-passage *j* is also in the wall I on a line with the top passage i^3.

A governor-valve L is employed to control the inlet and outlet of oil to and from the plunger-cylinder. This valve is in the form of an ordinary key-plug, provided with an angle-passage, and which has a handle *k* at one end. This end projects through the chair-base A, so that the handle is on the exterior, where it is accessible to the hand or foot of the operator. The key-plug valve L has a horizontal position in the vertical wall I at the intersection of the three passages i^3, i^4, and *j*. The plug, in the present instance, has a right-angled passage in it, so that when the plug is in one position (see Fig. 7) the oil will flow from the pressure-chamber C to the plunger-cylinder to elevate the chair-body, and when the plug is in the other position (see Fig. 8) the oil will exhaust from the plunger-cylinder and discharge from the passage *j*, taking the following course: through opening i^6, passage i^5, passage i^4, right-angled passage in the key-plug and discharge-passage *j* into the main oil-reservoir B to lower the chair-body.

The valve-plug L is tapered, and at the small end has a pin *m* and a metal washer-plate *m'*. A spiral spring is around the valve-plug between the wall I and the washer-plate *m'* and serves to keep the tapered plug drawn tight, so as to cause it to fit close.

The governor-valve here described constitutes a two-way cock having two operative positions and a blank position. When the valve-handle *k* is in a position farthest to one side, as it would be in Fig. 7, the chair-body will elevate. When in the middle position, the passages will be blanked and oil will not pass in either direction. When in a position farthest to the opposite side, as it would be in Fig. 8, the chair-body will lower.

The plunger F has at its lower end a packing K' to fit tight in the cylinder D, and is also provided with a vertical groove *l*. A pin or screw *l'* (see Fig. 4) enters the side of the cylinder D and projects into this groove. The plunger is then free to raise and lower, but is hindered from rotating in the cylinder by the pin *l'*.

The pump-piston G is depressed or forced down by the lever J, which is arranged to give great power, and said piston is raised by the retracting-spring *n*. A suitable pivot-pin *o* is fixed horizontally at one side of the base. In this instance it is screwed thereto. The lever J has its eye *p* mounted on this pivot-pin. This lever extends alongside of and past the cylindric base A to the opposite side. A slot *q* is in the side of the pump-cylinder E, and a short arm *q'* is attached to the lever-eye *p* and projects through the said slot *q* into the cylinder, and a link-bar *r* connects between the pump-piston G and the said short arm *q'*. This short arm *q'* on the lever J is the direct means which forces the pump-piston G down. The lifting-spring *n* has its lower end attached to a pin *n'* between two ears on the short arm *q'* and its upper end attached to a cross-pin n^2, which rests in notches at the top of the cylinder E, as seen in Figs. 1 and 5. The spring *n* keeps the pump-piston G normally raised. When the piston is being raised, it sucks the oil up through the pendent pipe *f* and check-valve *f'* into the cylinder E. When the piston G is forced down by the lever J, the check-valve *f'* closes and the oil in the cylinder E is forced through the passage *g* and check-valve *g'* into the pressure-chamber C, and thereby the air therein is compressed. The frame N, which holds the chair-body, rests upon the plunger F.

The operation of the device thus far described is as follows: At the outset the chamber C is full of air—that is, ordinary atmosphere—in normal condition, (no pressure.) Now by working the pump-lever J oil will be pumped from the reservoir B and transferred to the pressure-chamber C. As the oil fills into the chamber of course the air therein will become compressed. This compression by the pump may be continued until the pressure stored up in the chamber C amounts to, say, one hundred pounds or more per square inch. This stored-up air-pressure is then ready to be utilized as the power to impel the oil and thus raise the plunger F and chair-

body. The raising and lowering of the chair-body is accomplished through the medium of the plug-valve L, as hereinbefore described.

It will be understood that there is no pressure at any time in the oil-reservoir B.

The drawings show the pump arranged to primarily force oil into the closed chamber C, where air is confined. By this arrangement of pump it results that both the oil and air are necessarily placed under compression. It will be obvious to any skilled mechanic that the same result will be obtained by a different arrangement for the pump. Obviously there can be no difference in the result or in the operation of this chair whether a pump is employed to primarily force the oil or to primarily force the air. Either will do.

Provision is made to automatically seal the pressure-chamber when the oil contained therein has been nearly exhausted by raising the plunger F. This sealing will prevent both the entire exhaustion of the oil or the escape of the compressed air from said chamber C. The means employed for sealing consist of a ring-dam or upward-projecting tube *s* on the upper side of the bottom *d* of the pressure-chamber. This dam or tube may rise from the bottom *d* to any desired height and surround the passage or opening *w*, through which the oil passes from the pressure-chamber C to the plunger-cylinder D. A ball-valve *s'* is designed to seat on the top of the ring-dam or tube *s* and close it. A cage *t* is mounted on the said ring-dam and incloses the ball-valve and keeps it in position where it will seat when the oil which floats it has been reduced low enough. It will be understood that as long as the pressure-chamber C contains enough oil to cover the cage *t* the ball-valve *s'* in the cage will float and remain elevated or floating in the top of the cage. The operations of raising or lowering the chair will not cause the ball-valve to seat as long as it is thus kept floating; but when the oil in the pressure-chamber is lowered below the top of the cage *t*, then said valve will be seated whenever an effort is made to raise the chair, and no more oil can be discharged from the pressure-chamber.

The plunger F is prevented from rotating by the groove *l* and pin *l'*, as already described; but I have made provision for turning the chair-body (not shown) in a horizontal plane on the pivot or axis of the plunger, so as to permit the chair-body to be adjusted on said pivot to suit the convenience of the operator. This provision is shown in Figs. 1 and 3, and comprises a circular head T, fixed rigidly on the top of the plunger F. This head has notches *u* around its rim. The upper end of the plunger projects through and above the circular head T, and said end forms a pivot *v*. A chair-seat frame N is loosely pivoted on the said end *v*, so as to revolve thereon above the head T, and is secured by a screw *v'*. This seat-frame N has two trunnions v^2, on which the chair-body (not shown) is to be pivoted, so as to permit the chair-body to tilt. The seat-frame N carries a pivoted dog *u'*, which may engage any one of the notches *u* on the rim of the head T. It will be seen that the dog *u'* may be tilted to disengage from a notch, and then the chair-seat frame N may be turned in a horizontal plane on the pivot *v* to any desired position, whereupon the dog will engage another notch and thus hold the chair-body from further rotation. Oil is supplied to the reservoir B at the hole *b'*, which may be closed by a plug or otherwise.

I have described my improvement as operating by the action of oil and air under compression. It is obvious that the mechanism here described is capable of being operated by air alone under compression. The only change to note with air alone would be that the ring-dam *s* and ball-valve *s'* would be dispensed with.

I have plainly indicated that various features of the construction here shown may be changed and altered. My invention therefore is not limited to this construction.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In an elevating-chair, the combination of a chair-base having a pressure-chamber for liquid, such as oil, to be acted on by air under compression; a liquid-reservoir in said base; a pump to produce pressure; a cylinder in communication with said pressure-chamber; a plunger in the said cylinder and supporting the chair-body; a valve to control the flow of liquid from the pressure-chamber to the plunger-cylinder; and a valve independent of said controlling-valve and operated by the lowering of the liquid in the pressure-chamber, for preventing the further outflow of liquid from said chamber when the liquid has been lowered to a predetermined point.

2. In a chair, the combination of a chair-base having a pressure-chamber for both liquid, such as oil, and air an oil-reservoir; a pump inclosed in the chair-base to place the liquid and air under compression; a cylinder also inclosed in the chair-base having its lower end in communication with the lower end of the pressure-chamber by means of a passage; a plunger in the said cylinder, said plunger supporting the chair-body; and a valve to control the flow of oil from the pressure-chamber to the said plunger-cylinder.

3. In a chair, the combination of a chair-base having a pressure-chamber for liquid, such as oil, to be acted on by air under compression; an oil-reservoir below the pressure-chamber; a pump; a communication between the oil-reservoir and pump-chamber and between the pump-chamber and pressure-chamber, with check-valves controlling said communications; a cylinder inclosed in the chair-base and having its lower end in communication with the lower end of the pressure-chamber by means of a passage; a plunger in the said cylinder, said plunger supporting

the chair-body; and a governor-valve which controls the flow of oil from the pressure-chamber to said plunger-cylinder, and from the plunger-cylinder to the oil-reservoir to lower the chair-body.

4. In an elevating-chair, the combination of a chair-base having a pressure-chamber for liquid, such as oil, to be acted on by air under compression; an oil-reservoir in said chair-base; a pump to place the oil under compression; a cylinder having its lower end in communication with the lower end of the pressure-chamber; a plunger in the said cylinder and supporting the chair-body; and a key-plug valve having an angle passage-way which controls the flow of oil from the pressure-chamber to said plunger-cylinder to elevate the chair-body, and from the plunger-cylinder to the oil-reservoir to lower the chair-body.

5. In an elevating-chair, the combination of a chair-base having a pressure-chamber for the storage of liquid under pressure; a liquid-reservoir; a cylinder in the base having its lower end in communication with the lower end of the pressure-chamber by means of a passage; a plunger in said cylinder and supporting the chair-body; a normally-open ring-dam, *s*, at the bottom of the pressure-chamber and connecting with said passage; a ball-valve normally floating in the liquid in the pressure-chamber and adapted to seat on top of said ring-dam and close said passage only when the liquid has fallen to a predetermined point; and a valve independent of the said ball-valve and having position in said passage between said ring-dam and plunger-cylinder and controlling the flow of liquid to the plunger-cylinder as long as the ball-valve is floating.

6. In an elevating-chair, the combination of a chair-base having a pressure-chamber; a cylinder in said chair-base having its lower end in communication with the pressure-chamber; a plunger in said cylinder and supporting the chair-body; a pump-cylinder inclosed in said chair-base and having a slot, *q*, in its wall; a piston in the said pump-cylinder; a lever on the exterior of the chair-base and having an eye, *p*, by which it is pivoted, said eye provided with a short arm projecting through the said slot in the cylinder-wall and connected with the piston; and a lifting-spring in the pump-cylinder attached to the said short arm of the lever.

7. In a chair, the combination of a chair-base having a pressure-chamber for liquid, such as oil to be acted on by fluid under compression; an oil-reservoir in communication with the pressure-chamber; a pump to transfer the oil from the oil-reservoir to the pressure-chamber; a cylinder having its lower end in communication with the lower end of the pressure-chamber; a plunger in the said cylinder and supporting the chair-body; an oil-supply passage leading from the pressure-chamber to the plunger-cylinder; an oil-exhaust passage to discharge oil from the plunger-cylinder to the oil-reservoir; and a single valve governing the flow of oil through both of said passages, whereby by moving the valve one way the exhaust-passage will be closed and the supply-passage opened to admit oil into the plunger-cylinder, and by moving the valve another way the supply-passage will be closed and the exhaust-passage opened to discharge the oil from said cylinder.

8. In a chair, the combination of a chair-base having a pressure-chamber for liquid, such as oil; a main oil-reservoir in communication with the pressure-chamber; a pump to transfer the oil from the oil-reservoir to the pressure-chamber; a cylinder having a plunger which supports the chair-body; an auxiliary oil-reservoir below the pressure-chamber and plunger-cylinder, and provided with an oil-supply passage leading to the plunger-cylinder and with an exhaust-passage to discharge oil from the plunger-cylinder to the main oil-reservoir; and a governor-valve which may be operated to close the exhaust-passage and open the said supply-passage, or to close the supply-passage and open the exhaust-passage, or to close both of said passages.

9. In a chair, the combination of a chair-base having a pressure-chamber; an oil-reservoir; a force-pump having its eduction side connected with the pressure-chamber; a cylinder provided with an inlet in communication with the pressure-chamber and an outlet or discharge in communication with the oil-reservoir; a plunger in said cylinder and supporting the chair-body; and valve mechanism for controlling the flow of oil from the pressure-chamber to the said plunger-cylinder and for discharging the oil from said plunger-cylinder.

10. The chair-base containing the oil-reservoir and the pressure-chamber, the plunger-cylinder communicating with said chambers, and the chair-body-supporting plunger; in combination with the force-pump communicating on its induction side with the oil-reservoir and on its eduction side with the pressure-chamber, and the three-way valve mechanism for controlling the inlet and outlet openings of the plunger-cylinder, substantially as and for the purpose hereinbefore set forth.

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

WILLIAM B. MANN.

Witnesses:
CHARLES B. MANN, Jr.,
C. CALVERT HINES.