No. 619,153. Patented Feb. 7, 1899.

J. J. EGAN & A. E. HOOK.

DISAPPEARING CHAIR.

(Application filed May 14, 1898.)

(No Model.) 2 Sheets—Sheet 1

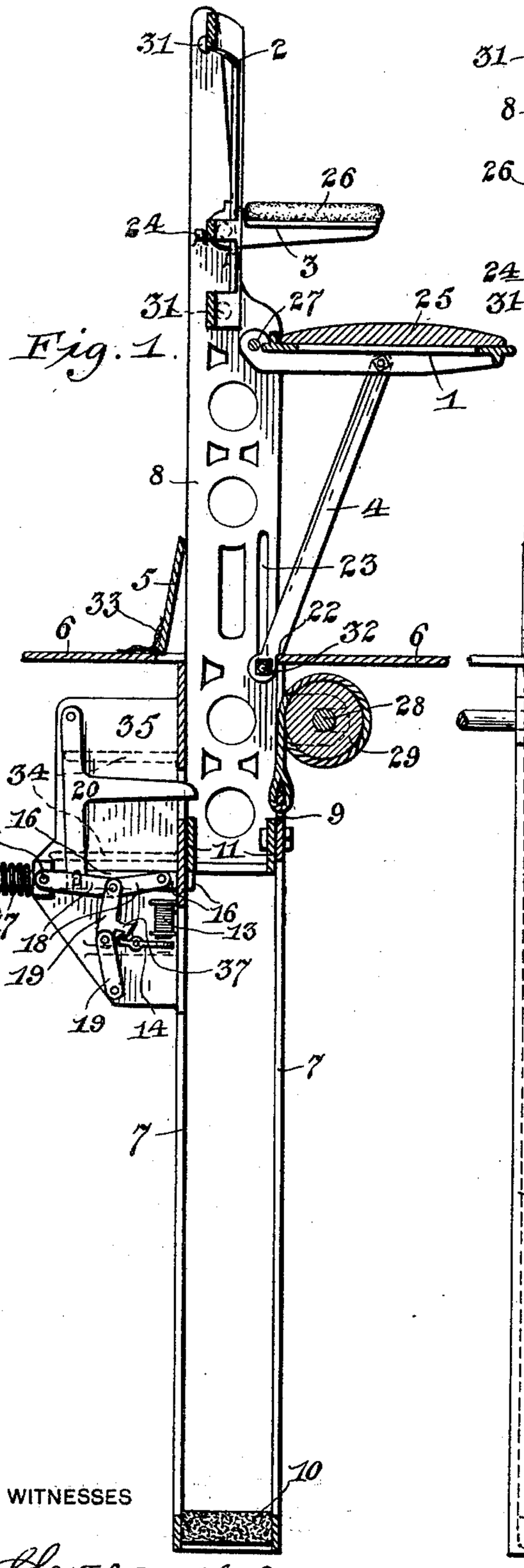

Fig. 1.

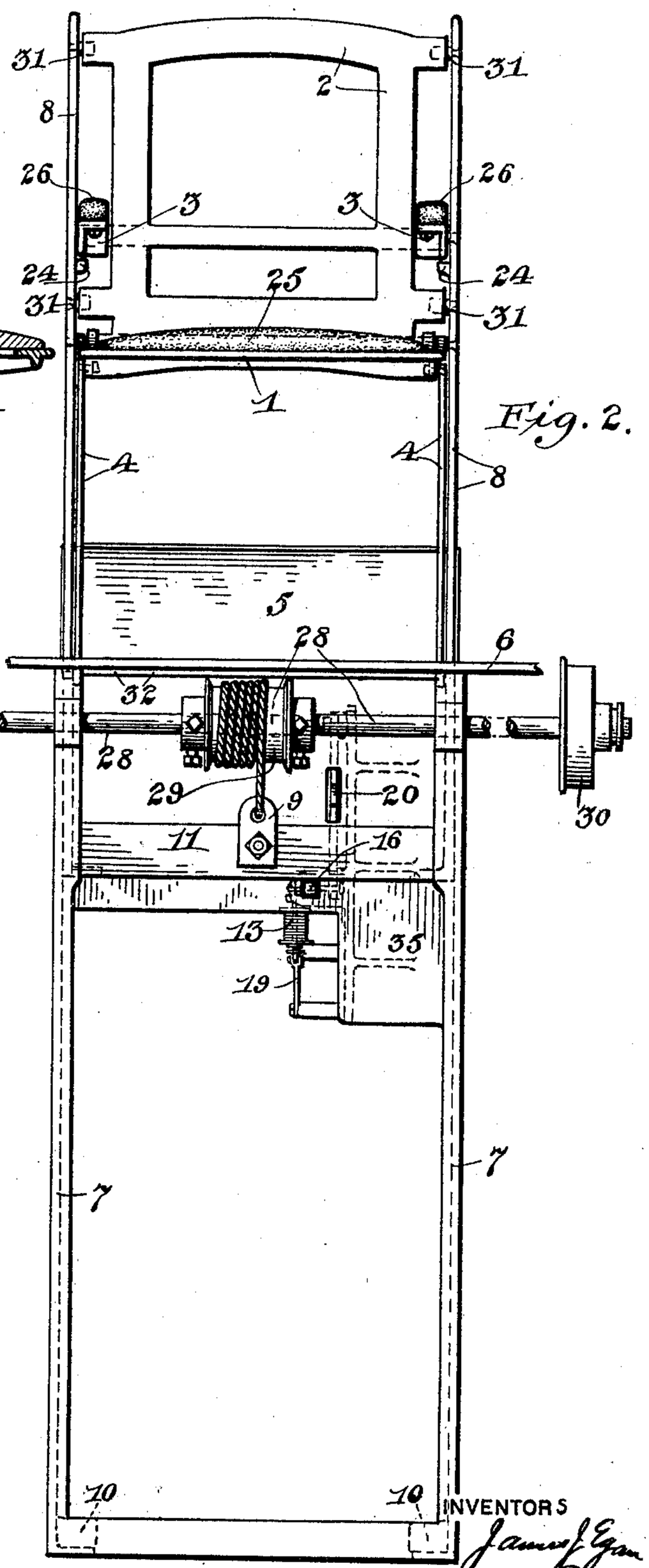

Fig. 2.

WITNESSES

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Fig. 4.

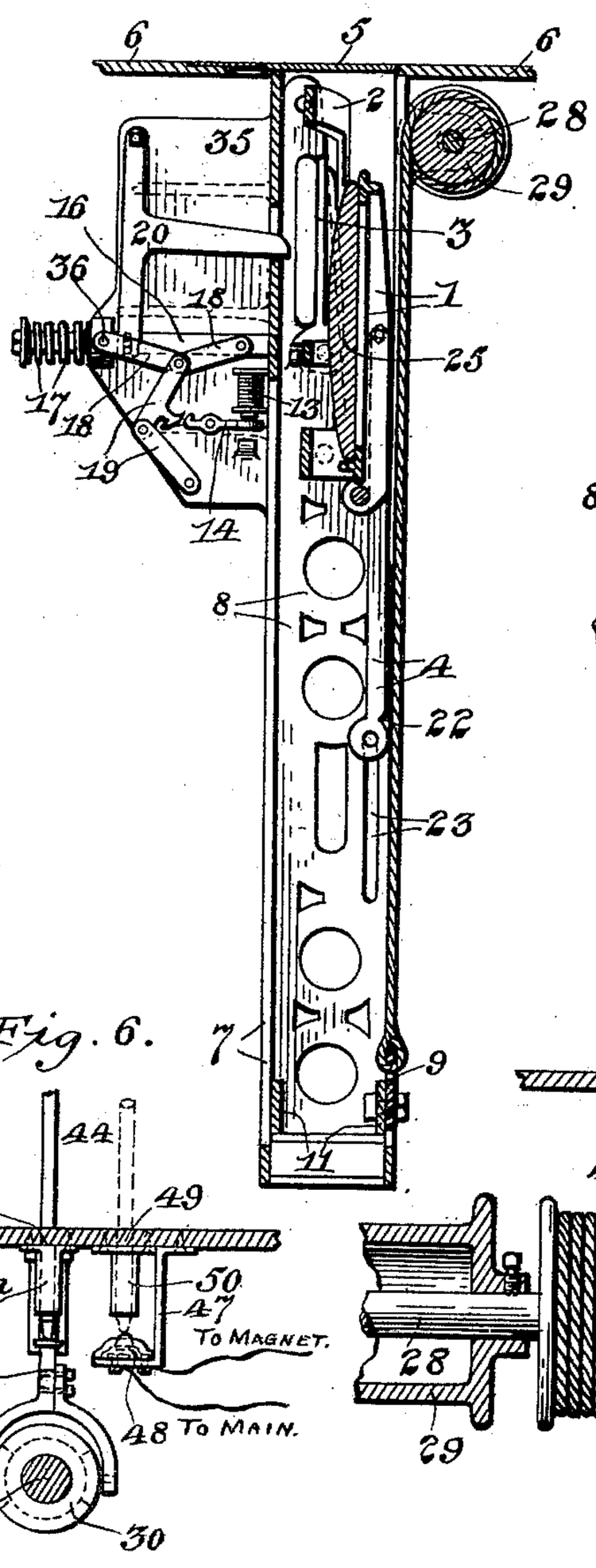


Fig. 3.

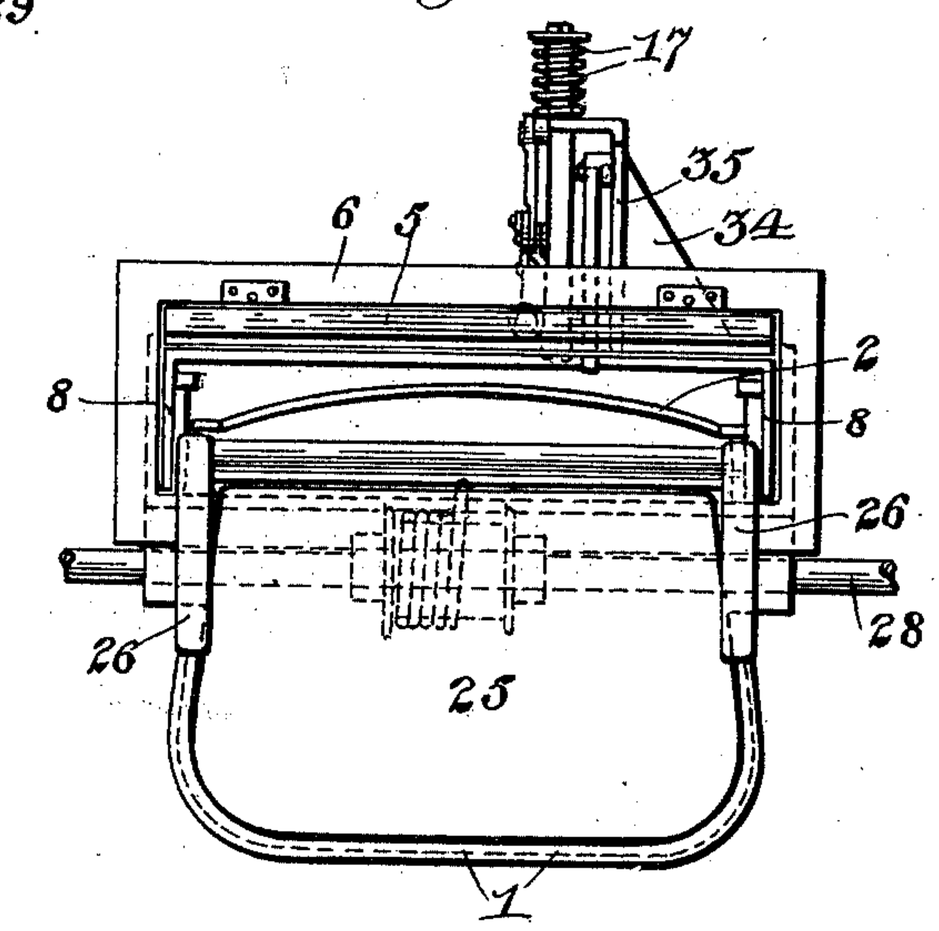
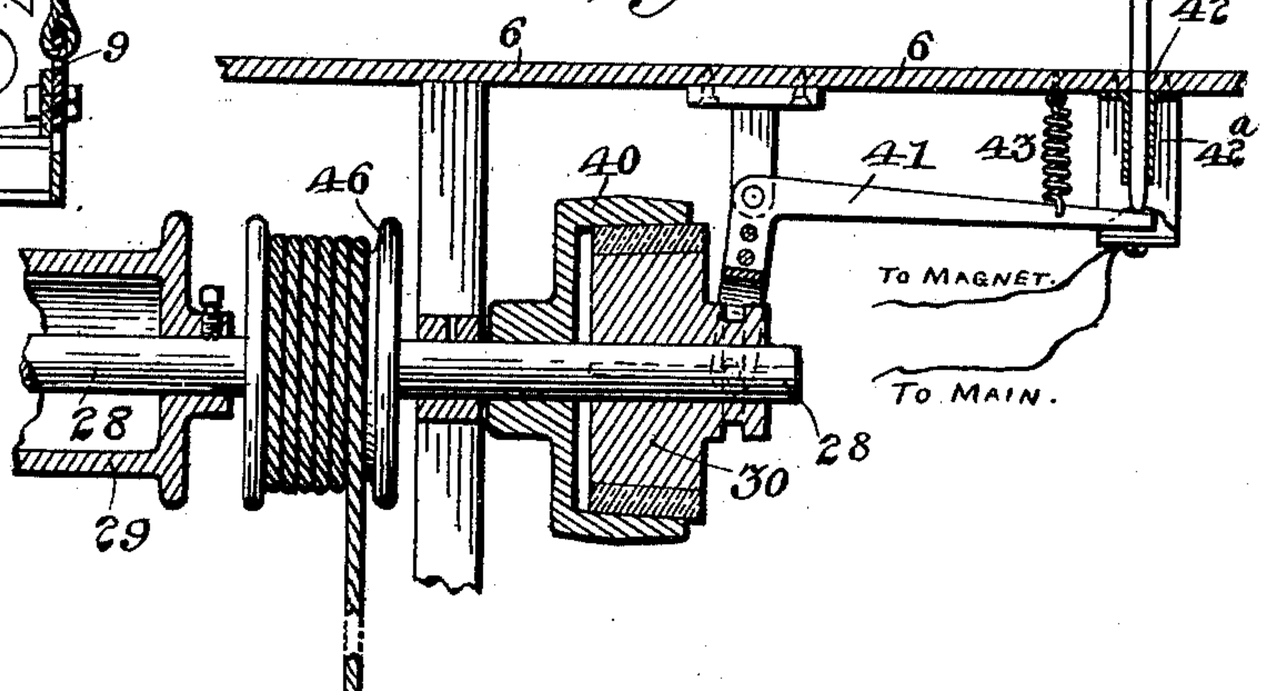


Fig. 6.

Fig. 5.



WITNESSES

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UNITED STATES PATENT OFFICE.

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DISAPPEARING CHAIR.

SPECIFICATION forming part of Letters Patent No. 619,153, dated February 7, 1899.

Application filed May 14, 1898. Serial No. 680,720. (No model.)

To all whom it may concern:

Be it known that we, JAMES J. EGAN and ALEXANDER E. HOOK, citizens of the United States, residing at Butte, in the county of Silver Bow and State of Montana, have invented certain new and useful Improvements in Disappearing Chairs; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

Our invention relates to chairs, seats, or like appliances, and more particularly to that class of chairs which are adapted to disappear through a floor or support upon which they are mounted.

The invention consists in certain novel constructions, combinations, and arrangements of parts, as will be hereinafter fully described and claimed.

In the accompanying drawings, Figure 1 represents a central vertical section through our improved disappearing chair, showing the mechanism for controlling the same. Fig. 2 represents a front elevation of the same. Fig. 3 represents a top plan view of the said chair in its upper position, and Fig. 4 represents a vertical section through the chair as in its folded and lowered position. Fig. 5 represents a detail illustrating the clutch-operating mechanism, and Fig. 6 is a detail showing the manner of mounting a push-button beneath the floor.

1 in the drawings represents the seat; 2, the back thereof; 3, the arm-rest supports; 4, the safety-legs for the seat; 5, a trap-door, and 8 the sliding frame of the chair.

A seat of the character of the herein-described invention is found very desirable for use in public places, and it carries many advantages and safeties which the ordinary seat does not possess. It is applicable, particularly, to opera-houses, churches, school-houses, and public places of other descriptions. By the use of these disappearing seats an opera-house can be used for a dance-hall, a church for a charitable fair, and a school-house for a drill-room, and, in fact, anything where chairs are not needed. The device is of such a character that all chairs can be immediately lowered below the floor and out of sight, and they can as quickly be raised into position for use again. Among other advantages which these chairs possess may be named that of the prevention of accidents in the case of fire, stampede, and other similar occurrences in public houses. In case of fire they can be dropped out of the way, so as not to be exposed to the fire or water that might otherwise damage or destroy them. It is also useful when it is desired to clean or sweep the place and when repairing or painting is being carried on. Another desirable feature of a chair of this kind is that in the case of one or more seats alongside the aisle being occupied first and parties having tickets for the inner seats coming later that row can be dropped by a simple mechanism in the aisle and easy access be had to the desired places, when the chairs can be immediately restored to their former positions. In carrying out these features the chair-seat 1 is constructed in any well-known manner, preferably being provided with a seat-frame which is pivotally mounted to the chair-frame 8, as at 27. The seat is preferably provided with a cushion, as 25, to make a comfortable supporting-surface. The back 2 of the chair is pivoted between the side frames and is limited in its movement by means of stops 31, which allow sufficient movement of the chair-back to enable it to conform to different positions of the back when resting against it. The arm-rests, as 3 3, are pivoted to the frame 8 and are provided with lugs which engage stops or lugs 24, mounted upon the frame 8. When the arm-supports 3 are folded up, the lugs engage the stops 24 and limit the movement of the said rests. The rests may be provided with any suitable cushions, as 26. The seat 1 when in its lowered position is adapted to be supported by means of bars 4 4, pivoted to the seat-frame at their upper ends and connected at their lower ends across the frame of the chair by means of a rung or rod, as 32. The outer ends of this rod or rung are preferably slightly reduced and engage vertical slots, as 23, formed in the said frame 8. The bars 4 are also provided with notches, as at 22, which are adapted to engage the edge of the floor which surrounds the opening through which the chair disappears. This notch, it will be seen, operates to hold the chair from descending when there is any weight upon the seat 1; but when the weight

is removed from the seat and the supporting-latch is withdrawn to allow the chair to disappear the notch will merely operate to throw the seat into its folded position, so as to permit it to pass down through the opening in the floor.

The frame 8 consists, preferably, of two side pieces which support the seat and back, as above described, at their upper ends and at their lower ends extend slightly below the floor when the chair is not lowered and are connected by means of cross-bars, as 11. The frame 8 of the chair is adapted to slide in the frame 7, mounted beneath the surface of the floor 6, and may be of sufficient length to receive the entire frame 8. Rubber bumpers, as 10, are located in the lower or bottom portion of the guide-frame 7 and receive the chair-frame when it is dropped, thus preventing jar and noise. A trap-door, as 5, is hinged to one edge of the opening in the floor 6 and is normally held against the frame 8 of the chair by means of a spring, as 33. This spring tends to hold the trap-door always against the frame, so that the minute it drops beneath the floor the trap-door will drop of its own accord. When the chair is raised again, it will push the door open and hold it in that position until the chair is again dropped.

To the lower frame 7, near its upper end or a short distance below the floor, a laterally-extending frame or projection 35 is formed, upon which is mounted the bolting and tripping mechanism. This projection is preferably strengthened by means of webs, as 34 34. A bolt, as 16, is horizontally mounted upon the projection 35 and is adapted to slide through suitable bearings formed thereon, one end projecting beyond the outer bearing and being surrounded by a spring, as 17. The spring 17 is made of sufficient strength to withdraw the bolt 16 from beneath the chair-frame, the said spring being interposed between one of the bearings of the bolt and a washer and nut secured to the outer end of the said bolt. The inner end of the bolt projects through the frame 7 sufficiently far to engage one of the lower bars 11 of the seat-frame. A T or bell-crank lever 20 is pivotally mounted upon the extension 35 of the frame and is bifurcated at one end to engage a pin 21, mounted upon the bolt 16. One leg of the lever 20 extends into the frame 7 through a suitable slot, so as to be engaged by one of the lower bars 11 when the chair-frame is raised, the lever being thus caused to move the bolt 16 forward beneath the said bar 11 to support the chair in the casing 7. In order to permit the spring 17 to withdraw the bolt 16 from beneath the chair, a suitable tripping mechanism is also mounted upon the said extension 35, which consists, preferably, of toggle-links, as 18 18, one of said links being pivoted to a fixed point upon the extension 35, as at 36, and the other link being pivoted to the bolt 16. The meeting ends of the links 18 18 are pivotally connected to one link of a second set of toggle-links 19 19, the lower end of the lower link 19 being pivoted to the fixed support or projection 35. The upper link 19 is provided near its junction with the lower link with a hook or catch, as at 37, which is adapted to engage the hooked end of a trip 14, which is pivotally mounted to said support 35. The inner end of the said trip is constructed in the form of an armature and is placed opposite the end of a magnet, as 13, of the ordinary construction. It will be apparent from an inspection of Fig. 1 of the drawings that the trip 14, through the toggle-levers 19 18, operates to hold the bolt 16 beneath the chair-frame to support it against the action of the spring 17. Now when an electric current is passed through the electro-magnet 13, so as to energize the same, it draws the trip 14 toward it and releases the catch 37, whereupon the spring 17 is free to act upon the bolt 16 and withdraw it from beneath the chair-frame, which will immediately drop into the frame 7. In order to raise the chair again to its normal position, a clip, as 9, secured to one of the bars 11, is connected with a cable or rope which is secured to a drum 29. The drum 29 is rigidly secured to a horizontal shaft 28, mounted in suitable bearings formed upon the frame 7. The shaft 28 may be extended to any suitable point in the building and may run along under a series of seats, so as to operate any number of them at a time. Power may be communicated to the shaft 28 from any suitable motor located in the building, and a clutch, as 30, may be mounted upon the shaft, so that the parts may be under electrical control.

While any suitable clutch may be used for throwing the chair-lifting mechanism into operation, yet I prefer to use a clutch, as shown in Fig. 5 of the drawings, in which a loose pulley, as 40, is mounted upon the shaft 28 and allowed to run freely thereon, any suitable belt being used to connect the said pulley with the power-supplying machinery. The pulley is preferably made hollow and the inner periphery thereof formed with a friction-surface adapted to engage the friction-clutch 30. The clutch 30 is preferably splined to the shaft 28, so that it may be moved longitudinally upon the shaft, but when it is revolved will communicate a revolving movement to the said shaft 28. Any suitable friction-surface may be formed upon the periphery of the clutch 30 to engage the inner periphery of the loose pulley 40. An operating-arm or bell-crank lever, as 41, is pivotally mounted to the under side of the floor and adapted to engage an annular groove in the hub of the clutch 30, the other end of the said lever extending to a point beneath an opening or aperture, as 42, formed in the floor 6. A coil-spring, as 43, secured to the under side of the floor at one end and connected to the lever 41 at the other end, tends to hold the clutch 30 normally out of engagement with the loose pulley 40. The aperture 42 is preferably pro-

vided with a guide-sleeve, as 42ª, secured to the under surface of the floor and is adapted to guide an operating-stick, as 44, to the end of the lever 41. By thrusting the stick through the opening 42 the end of the lever 41 may be depressed and the clutch 30 be brought into engagement with the pulley 40 for rotating the lifting-shaft 28.

It is preferable to keep the shaft 28 in its unwound position when the chairs are not being raised, and for this purpose I attach a weight, as 45, to a drum, as 46, upon the shaft 28 by means of any suitable cable or rope. This weight always tends to unwind the drums 29 when the friction-clutch is in engagement with the power-pulley 40, so that in case one chair in a row were to be dropped it would not have to revolve the shaft 28 in order to be able to descend, its lifting-cable being already made slack on account of the unwinding of the shaft 28.

As before stated, a push-button may be located beneath the floor to be operated by a stick or rod in the same manner as the clutch mechanism is operated. A desirable way of mounting such a button is shown in Fig. 6 of the drawings, in which a button-supporting bracket, as 47, is secured to the under side of the floor and carries an electrical push-button, as 48, of any suitable or well-known construction, the said button being so held as to be directly beneath an aperture, as 49, in the floor 6. This aperture is preferably elongated by a guide-sleeve, as 50, to better direct the staff or stick to the push-button. It will be apparent from this construction that when it is desired to drop the chairs it is only necessary to insert the stick into the aperture 49 and press upon the push-button in order to accomplish the desired result. When it is wished to raise the seats again, the stick can be transferred to the aperture 42, and by pressing upon the lever 41 the clutch may be brought into engagement with the power mechanism and the chairs all raised again.

As seen in Fig. 3 of the drawings, the seat is so formed and shaped with respect to the arm-rests 3 that when the seat is folded so as to descend through the opening in the floor it will engage and lift the arm-rests and fold them back out of the way also. It will be apparent that an electric button or other suitable means connected with the magnets and the clutch mechanism might be situated at any suitable or definite place in the house, so that by merely touching a button all the seats in the house may be dropped in an instant and the trap-doors covered over them to make a smooth floor. So, also, by operating another button of similar mechanism the seats may all be raised again to their normal positions. In case a single row of seats was to be operated without affecting the other seats in the house other electrical connections, as buttons, placed at certain points in the floor near the row of seats to be operated upon might be manipulated by an usher or other person to raise or lower that particular row of seats. As above described, by the use of the safety-legs 4 the trip of the bolts would only operate to trip those seats which were not occupied, the other seats remaining in position until the person or persons operating them get up, when the seats would immediately disappear beneath the floor. This principle of having the seats incapable of dropping when occupied is an important feature of our invention and is a very desirable construction in seats of this character.

The trap-doors, as 5, may be provided with rubber gaskets or packings around their edges adapted to form snug joints with the openings in the floor, so that when the seats have been lowered water or dirt and dust or other matters cannot find their way to the seats.

In case a row of seats were arranged upon a curved line, as is the case in many public houses, the shaft 28 for raising them can be provided with universal joints or knuckles of any well-known description, so that one shaft may be used for each row, the same as when they are located upon a straight line.

It may be desirable to place the push-buttons or other electrical apparatus for operating these chairs in buildings in such a way that mischievous parties cannot operate them whenever they desire. One manner of doing this is by placing the button in a box with a glass front which has to be broken before the button can be reached, similar to the mechanism employed in fire-alarm-box keys. This would avoid all danger of tampering with the push-button when the chairs are in use.

An important feature will be noted in this chair, that every one operates independently of the other, so that should a person keep his seat after a button has been pressed and every other seat should be vacant all would drop except the one occupied, which when freed will also disappear with the others. Of course it will be apparent that minor changes may be made in the construction of our improved disappearing chair and the apparatus for controlling the same without departing in the least from the spirit of our invention.

Having now described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. A series of chairs each provided with a movable frame adapted to disappear beneath a floor or other supporting-surface, bolts for holding the chairs in a raised position, armatures for withdrawing the said bolts from beneath the chairs, electric magnets for energizing the armatures, and mechanical means for raising the chairs, substantially as described.

2. A series of disappearing chairs, each provided with a movable frame, means for supporting the said frame, means for preventing the occupied chairs from descending, means for withdrawing the chair-supports, the construction and arrangement being such that

only the unoccupied chairs will be caused to drop while the occupied chairs will remain raised, and mechanical means for raising the lowered chairs, substantially as described.

3. A chair provided with a moving frame adapted to disappear beneath a floor or other supporting-surface, a support for holding the chair in a raised position, an armature for withdrawing the said support and allowing the chair to descend, an electric magnet for operating the armature, a power-shaft provided with a drum, a cable attached to the drum, and to the chair, and means for revolving the shaft to raise the chair, substantially as described.

4. A plurality of disappearing chairs, each provided with a sliding frame, a support for one end of said chairs, mechanical means for releasing the supports and allowing any one or all of the chairs to descend, a shaft carrying drums, a cable attached to each one of the chairs and to the drums on the shaft, and means for operating the shaft to raise any one or all of the chairs, substantially as described.

5. In a disappearing chair, the combination with a frame, of a pivoted seat mounted thereon, safety-legs connected with the said seat and engaging slots in the said frame, the said legs being provided with notches for engaging the floor-surface, and means for raising or lowering the said chair-frame, the construction being such that when there is a weight upon the chair-seat, the same cannot be lowered, substantially as described.

6. In a disappearing chair, the combination with a suitable frame, of a guide for receiving the same beneath a floor or other support, a bolt mounted upon the said guide-frame, a spring for withdrawing the bolt, and means for holding the bolt against the action of the spring for supporting the chair, substantially as described.

7. In a disappearing chair, the combination with a moving frame, of a guide-frame for receiving the same, a bolt for supporting the chair in its upper position, a spring for withdrawing said bolt, and toggle-levers for holding the bolt in its engaging position, and an electric magnet for controlling the said toggles, substantially as described.

8. In a disappearing chair, the combination with a moving frame, of a bolt for holding the same in its upper position, means for withdrawing the said bolt, and a lever adapted to throw the bolt in its engaging position beneath the chair for supporting the same, substantially as described.

9. In a disappearing chair, the combination with a moving frame, of a bolt for supporting the same, means for withdrawing the said bolt, a bell-crank lever also engaging the said bolt, one arm of the said lever projecting into the path of a bar upon the chair-frame, the construction being such that when the chair-frame is raised the bell-crank lever will be caused to force the bolt beneath the frame again to support the same, substantially as described.

10. A disappearing chair provided with a movable frame, means for supporting the chair, means for withdrawing said support and allowing the chair to descend beneath the floor or other support, means for raising the said chair above the said floor or support, said elevating means comprising a shaft provided with a drum, and a cable attached to the chair and secured to the drum, and means for revolving the shaft, substantially as described.

11. A series of disappearing chairs, each provided with a movable frame, guides for receiving the same arranged beneath a floor, a bolt for supporting each of the chairs, braces connected to the seat of the chair and engaging the floor, electric means for tripping the bolts supporting the chairs, whereby all of the unoccupied chairs may be dropped simultaneously, substantially as described.

12. A series of disappearing chairs, each provided with a sliding frame, means for supporting the said frames, means for withdrawing the said supports, whereby all of the unoccupied chairs will be caused to drop, and means for raising all of the lowered chairs, simultaneously, from one source of power, substantially as described.

13. In a series of disappearing chairs, the combination with movable frames, of pivoted seats mounted thereon, safety-legs for supporting the said seats and which legs are provided with notches which engage the floor, bolts supporting the said frames and means for tripping all of the said bolts simultaneously, the construction being such that unoccupied seats will be caused to disappear at once, but those which are occupied will be held from dropping until freed by reason of the legs engaging the floor, substantially as described.

14. In a disappearing chair, the combination with a movable frame, of means for supporting and tripping the chairs, a shaft connected with the said frame by means of a cable, and means for rotating the said shaft for winding up the cable comprising a loose pulley mounted thereon, and a splined clutch adapted to be moved in and out of engagement with the said pulley, substantially as described.

15. In a disappearing chair, the combination with a moving frame, of a cable for connecting the said frame with a lifting-shaft, means for rotating the lifting-shaft comprising a loose pulley connected with any suitable power, a clutch splined upon the shaft for engaging said pulley, a lever engaging the said clutch and having one end arranged beneath an opening in the floor, and means surrounding said opening for guiding a stick to the end of said lever, whereby the clutch may be brought into engagement with the power-pulley, substantially as described.

16. In a disappearing chair, the combina-

tion with a movable frame, of a bolt for supporting the same, electrical means for tripping the said bolt, means for completing the circuit through the said electrical means comprising a push-button supported beneath the floor, and a guide-aperture adapted to direct a stick to the said push-button, substantially as described.

In testimony whereof we hereunto affix our signatures in presence of two witnesses.

JAMES J. EGAN.
ALEXANDER E. HOOK.

Witnesses:
THOS. P. NEWTON,
JOHN LAVERS.