(No Model.)

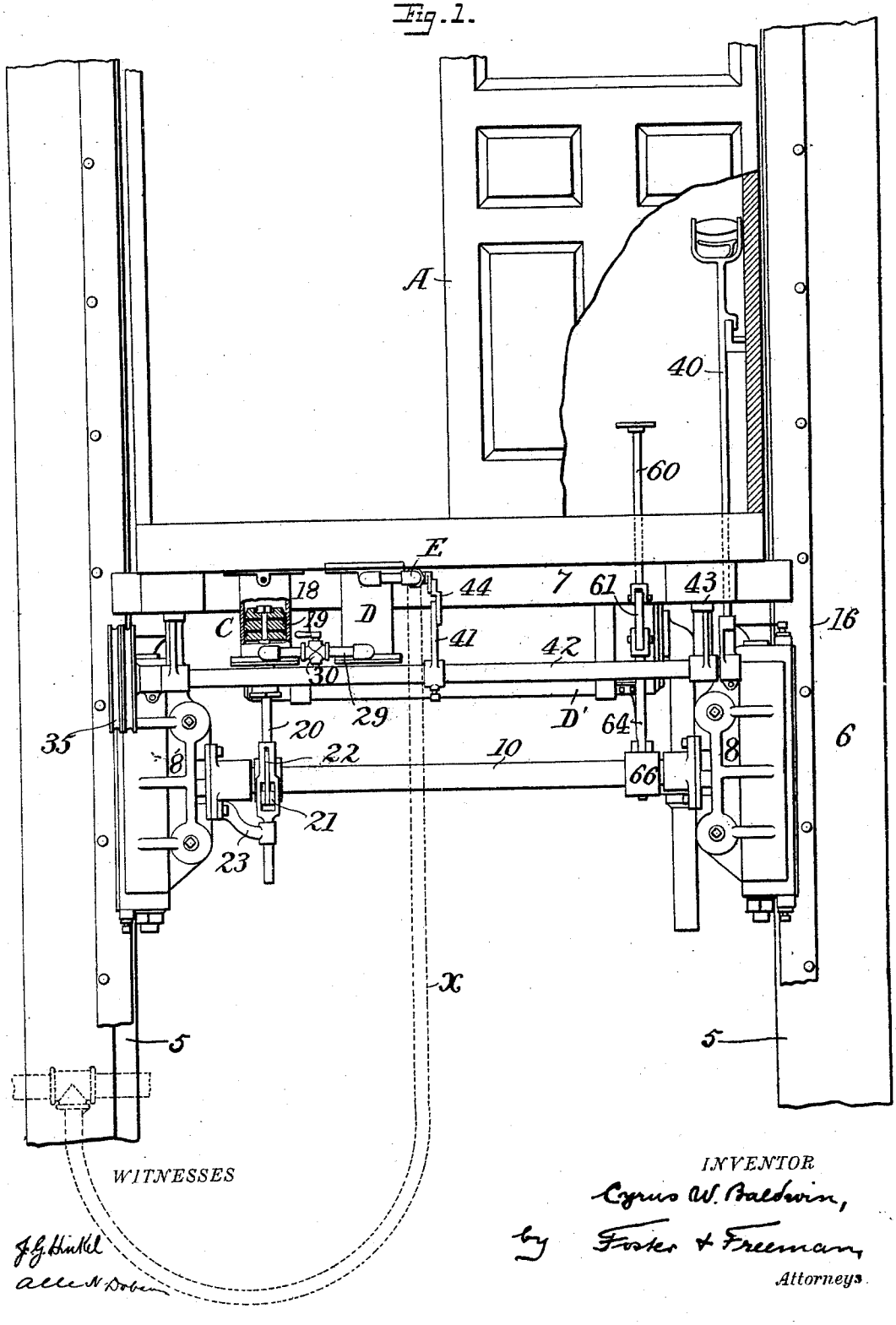
5 Sheets—Sheet 1.

C. W. BALDWIN.

ELEVATOR.

No. 519,804. Patented May 15, 1894.

Fig. 1.



WITNESSES

J. G. Hinkel

Allen N. Dobson

INVENTOR

Cyrus W. Baldwin,

by Foster & Freeman,

Attorneys

THE NATIONAL LITHOGRAPHING COMPANY,
WASHINGTON, D. C.

(No Model.)

5 Sheets—Sheet 2.

C. W. BALDWIN.

ELEVATOR.

No. 519,804. Patented May 15, 1894.

Fig. 2.

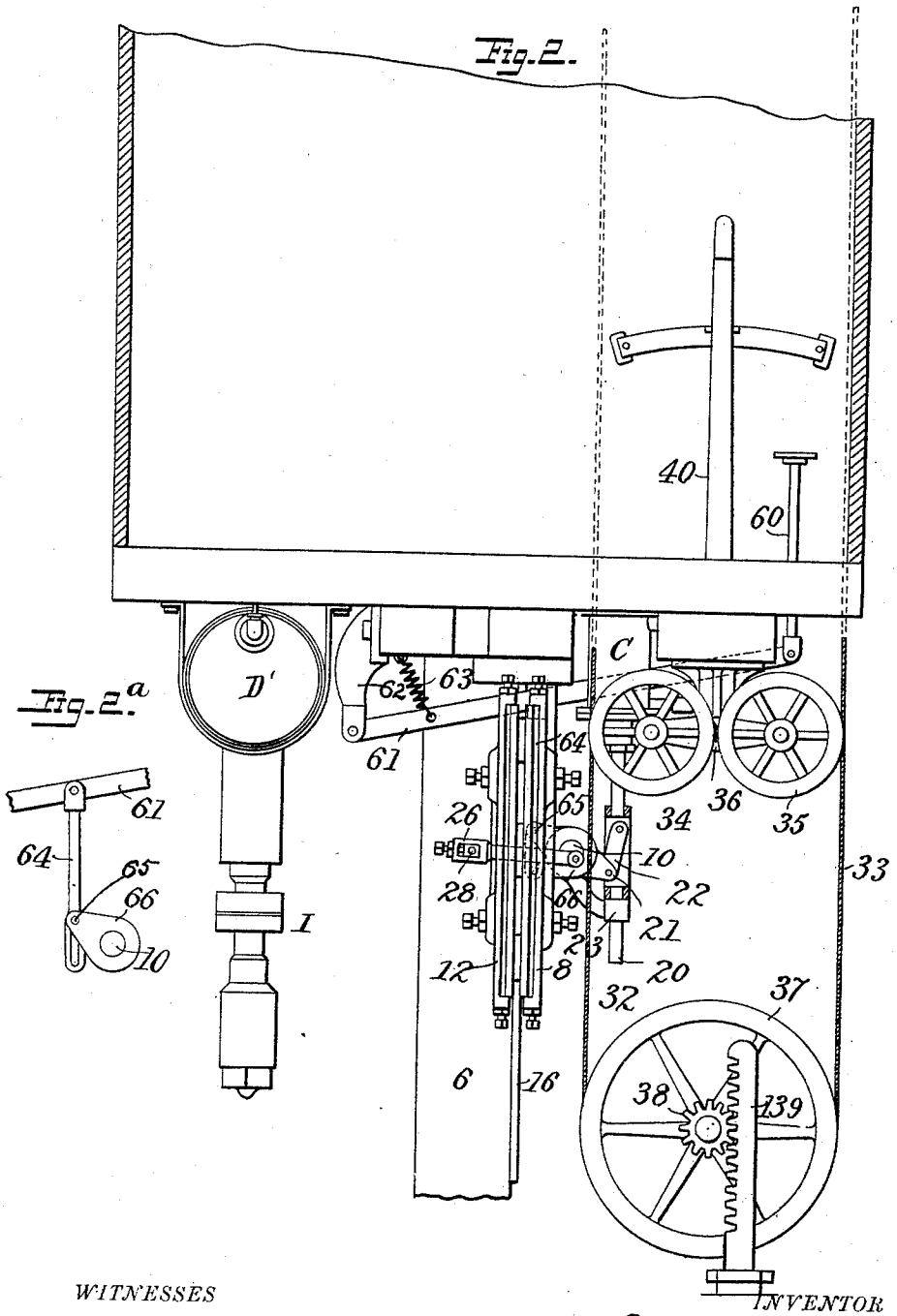


Fig. 2a.

WITNESSES

Jno. G. Hinkel

Allen N. Dobson

INVENTOR

Cyrus W. Baldwin,

by Foster & Freeman,

Attorneys.

THE NATIONAL LITHOGRAPHING COMPANY,
WASHINGTON, D. C.

(No Model.) 5 Sheets—Sheet 3.

C. W. BALDWIN.

ELEVATOR.

No. 519,804. Patented May 15, 1894.

Fig. 3.

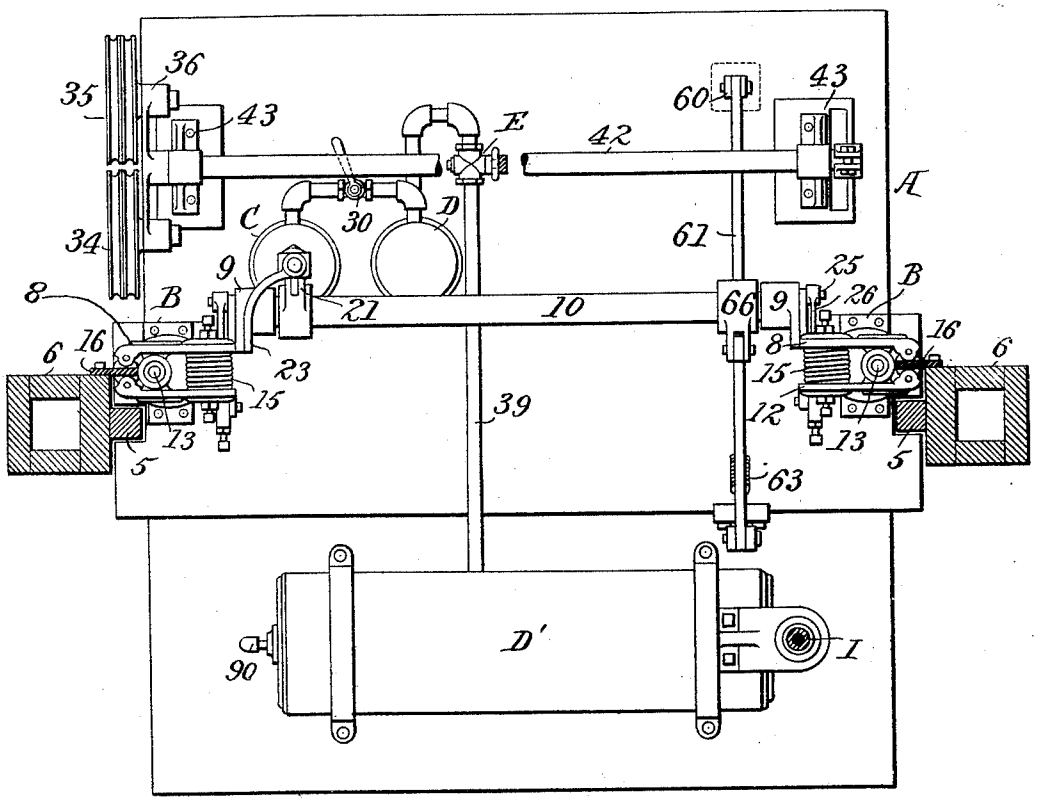


Fig. 5.

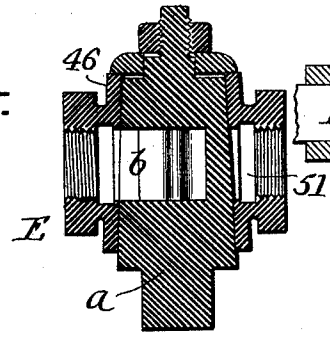


Fig. 4.

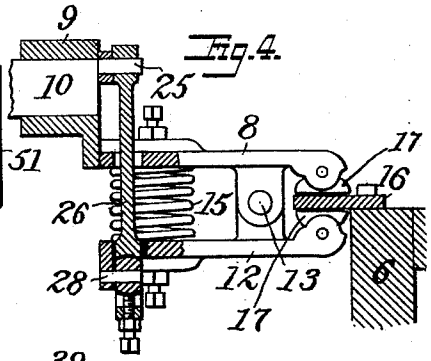
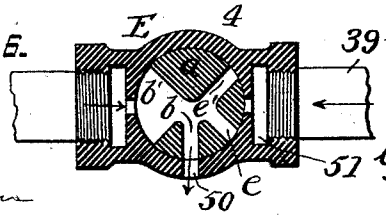


Fig. 6.



WITNESSES

Jno. Z. Hinkel

Alle N. Dobson

INVENTOR

Cyrus W. Baldwin,

by Foster & Freeman.

Attorneys.

THE NATIONAL LITHOGRAPHING COMPANY.
WASHINGTON, D. C.

(No Model.) 5 Sheets—Sheet 4.

C. W. BALDWIN.

ELEVATOR.

No. 519,804. Patented May 15, 1894.

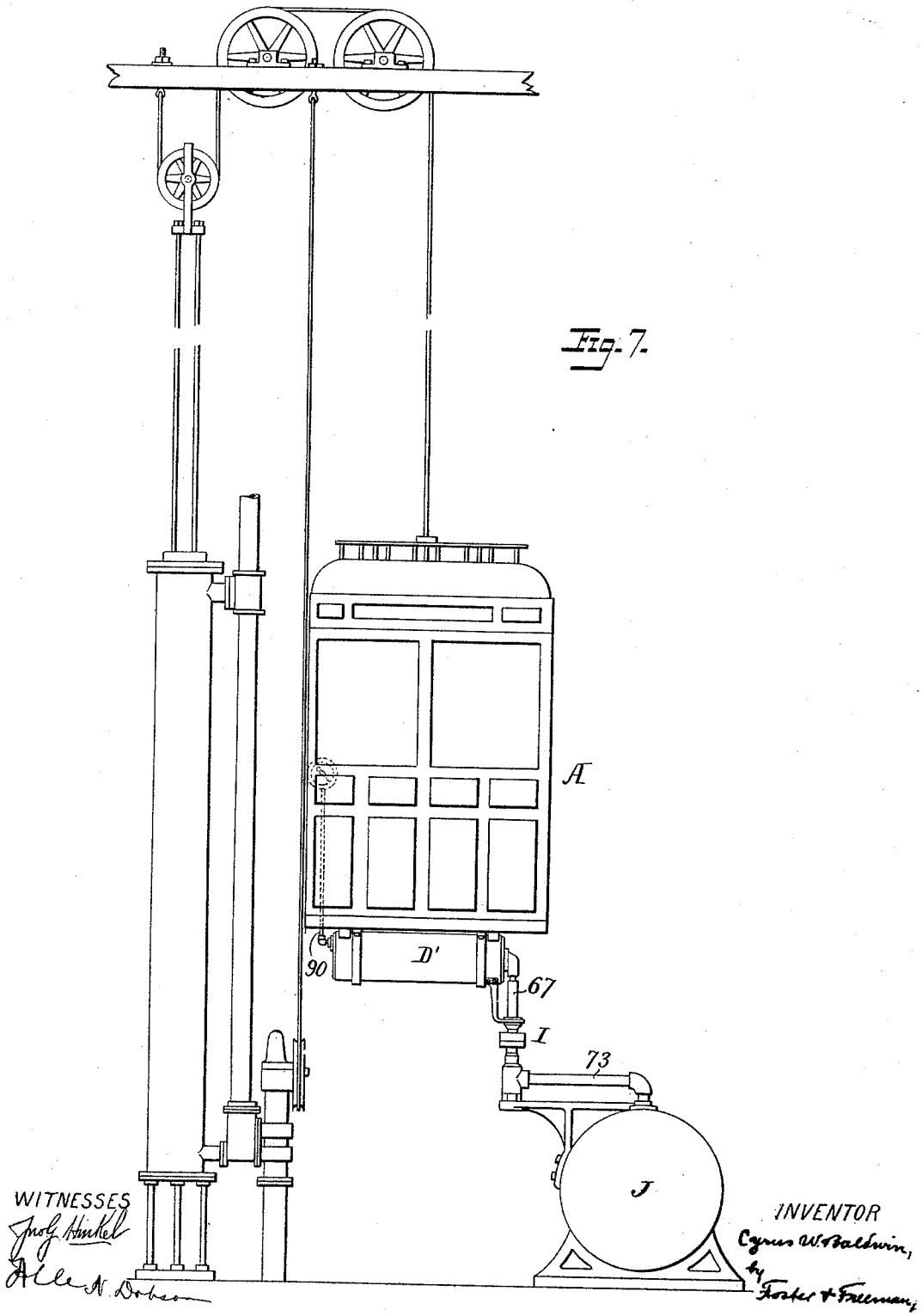


Fig. 7.

THE NATIONAL LITHOGRAPHING COMPANY,
WASHINGTON, D. C.

(No Model.) 5 Sheets—Sheet 5.

C. W. BALDWIN.

ELEVATOR.

No. 519,804. Patented May 15, 1894.

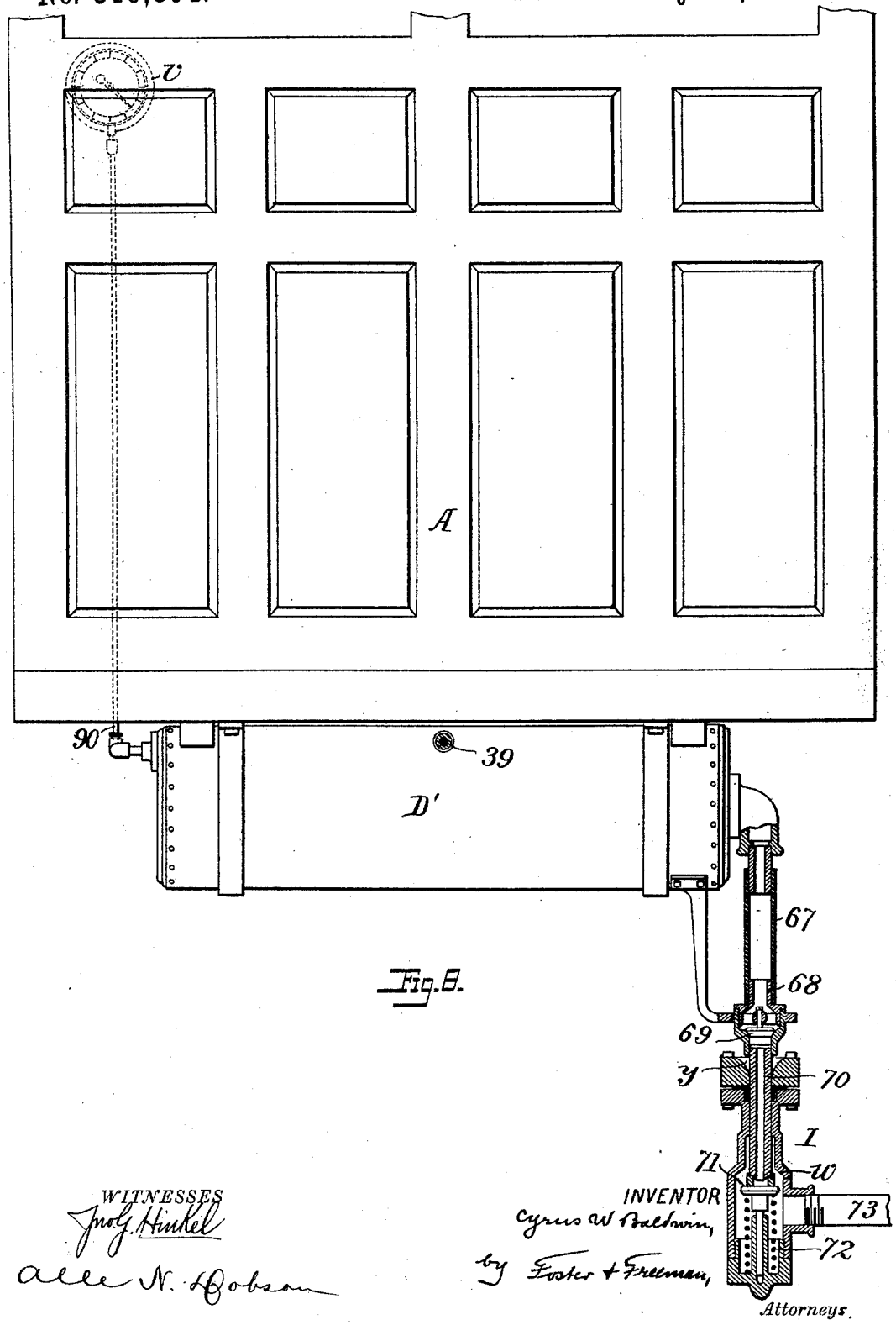


Fig. 8.

WITNESSES
Jno. J. Hinkel
Alec N. Hobson

INVENTOR
Cyrus W. Baldwin,
by Foster & Freeman,
Attorneys.

THE NATIONAL LITHOGRAPHING COMPANY,
WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

CYRUS W. BALDWIN, OF YONKERS, ASSIGNOR TO THE OTIS BROTHERS & COMPANY, OF NEW YORK, N. Y.

ELEVATOR.

SPECIFICATION forming part of Letters Patent No. 519,804, dated May 15, 1894.

Application filed June 13, 1892. Serial No. 436,530. (No model.)

To all whom it may concern:

Be it known that I, CYRUS W. BALDWIN, a citizen of the United States, and a resident of Yonkers, Westchester county, New York, have invented certain new and useful Improvements in Elevators, of which the following is a specification.

My invention relates to means for retarding or arresting the movement of elevator cages, and my invention consists of certain brake apparatus and adjuncts and means for operating the same, fully set forth hereinafter and illustrated in the accompanying drawings, in which—

Figure 1 is a side elevation in part section showing part of an elevator cage with my improved brake apparatus and appliances. Fig. 2 is a front elevation in part section. Fig. 2^a is a detached detail of part of one of the brake operating devices. Fig. 3 is a plan view of the bottom of the cage and the parts carried thereby, as seen from below. Fig. 4 is a sectional plan enlarged of one of the braking clamps and operating devices. Figs. 5 and 6 are sectional views of the valve controlling the flow of the motor fluid. Fig. 7 is an elevation showing the main engine, cage, supply tank upon the cage and means for replenishing said tank. Fig. 8 is an enlarged view in part section showing the cage, tank and replenishing devices.

The cage A, is constructed in any suitable manner and may move on guides 5, 5, supported by the vertical posts 6, 6, in the well, and beneath the cross-beam 7, at the bottom of the cage are supported two friction brakes or clamps B, B, which may be of any suitable construction. As shown, each clamp has a fixed jaw 8, forming part of a bracket, a projection 9, of which constitutes a bearing for one end of a rock-shaft 10, while the other jaw 12, vibrates upon a pivot or pintle 13, supported by the jaw 8, and a spring 15, between the inner ends of the jaws tends to separate said ends and bring the outer ends to bear against opposite sides of a friction bar or plate 16, bolted to the adjacent posts 6, so as to clamp the latter and retard or prevent the movement of the cage. As shown, each of the jaws of the clamp is provided with a pivoted shoe 17, which insures a uniform bearing at all times against the bar 16. The springs 15 are of such strength that when allowed to act between the longer arms of the jaws they will in connection with the leverage thus secured exert sufficient power to clamp the cage to the friction bars and hold it in position. It is therefore necessary to overcome the power of these springs in order to separate the jaws and for this purpose I make use of a motor engine C, of any suitable construction but preferably consisting of a cylinder 18, bolted to the under side of the cage and provided with a piston 19, the rod 20, of which is suitably connected to rock the shaft 10, the movement of which serves to separate the jaws of the clamps. As shown, the piston rod 20, is connected with an arm 21, extending from the shaft 10, through the medium of a link 22, pivoted to the end of the arm 21, and to the piston rod 20, which is guided at the lower end in a bracket 23, extending from one of the fixed jaws 8. The rock-shaft 10, is connected to operate the movable jaw through the medium of an eccentric pin 25, on the end of the shaft receiving the end of a connecting rod 26, the opposite end of which is slotted to receive a projection 28, of the movable jaw 12, and the parts are so set that when the crank-pin 25, is at a position farthest from the fixed jaw 8, the clamping ends of the jaws will be separated to unclamp the friction bar 16, while the movement or rocking of the shaft 10, in either direction will relax the draft upon the jaw 12, and permit the latter to swing under the action of the spring so that the jaws will clamp the friction bar. The power may be conveyed to the cylinder C, in any suitable manner and from any suitable source, for instance the lower end of the cylinder may be supplied with a liquid, preferably one that will freeze only at an extremely low temperature as glycerine, which liquid flows through a pipe 29, provided with suitable regulating cock 30, to and from a tank D, and the movement of the said liquid is controlled by a valve device E, which controls the flow of a suitable motor fluid under pressure from a pipe 39, and which permits the motor fluid to

exhaust from the tank D, when required The motor fluid may be an elastic fluid, as steam or air, or in some cases it may be an inelastic fluid, the former, however, being preferable, and it may be conveyed to the cylinder or tank through the medium of a flexible pipe *x*, communicating with the pipe 39, at one end and connected with the other to a supply pipe about midway of the height of the well, as indicated by dotted lines in Fig. 1, or the motor fluid may be supplied at intervals to the tank, as hereinafter more fully described.

By combining with the cage a brake apparatus the parts of which are applied to arrest the movements of the cage by the force of strong springs I am enabled to secure the application of the maximum force with certainty and rapidity whenever required, without depending upon variable and irregularly acting motor means, and by making use of a motor for compressing the springs I relieve the cage from the restraint of the braking devices without the exertion of any other power by the operator than that which is necessary to turn the valve E.

I prefer to connect the valve E, with the devices that control the valve of the main operating engine. Such devices may be variously constructed for instance as set forth in Letters Patent No. 390,053, issued to me September 25, 1888, and indicated in Fig. 2 of this application, there being two cable sections 32, 33, suspended at the upper ends from fixed bolts and passing in opposite directions under and over two grooved pulleys 34, 35, carried by a lever 36, upon the cage said cables then extending to the pulley 37, the movement of which shifts the main valve through the medium of a pinion 38, and rack 139. The lever 36, carrying the pulleys 34, 35, is connected with a hand lever 40, in the cage and when the latter is in a mid-position as shown in Fig. 2, the main operating valve is in a mid-position to arrest any movement of the main engine, and the connection with the brake devices is such that the brakes are then applied to clamp the friction bars. When the lever 40, is shifted in either direction there is a draft upon one or other of the cables 32, 33, shifting the valve to start the cage either upward or downward, and it is therefore necessary to so construct the valve E, and so connect it with the main valve operating devices that whenever the lever 40, is shifted from its mid-position the valve E, will be turned to admit the motor fluid to the cylinder C, and lift the piston thereof so as to compress the brake-springs 15, and release the brakes. As shown, an arm 41, upon a counter-shaft 42, supported by brackets 43, beneath the cage, is connected by a rod 44, with the arm of a plug valve *a*, that turns in the casing 46, of the valve device E, and the said shaft 42, is connected with or as shown, supports the lever 36, that supports the grooved pulleys 34, 35. When therefore, the lever 36, is turned to operate the main valve it will also turn the shaft 42 and operate the valve device E, of the brake device.

As it is necessary to exhaust the motor fluid when the main operating valve devices are in their mid-position and to permit the motor fluid to flow into the cylinder or tank when said devices are shifted in either direction, I therefore construct the valve device E, so that the valve will open an exhaust port 50, whenever the valve is in its mid-position, to permit the motor fluid to pass from the cylinder or tank, and so as to put said cylinder or tank into communication with the pipe 39, whenever the valve is swung in either direction from its mid-position. Thus, in the construction shown in detail in Figs. 5 and 6, the plug valve *a*, has two exhaust ports *b*, *b'*, and two inlet ports *e*, *e'*, and whenever the valve is in the mid-position, shown in Figs. 5 and 6, the fluid can exhaust from the tank D, through the ports *b'*, *b*, and exhaust port 50, while if the valve is turned in one direction the port *e*, is brought into coincidence with the inlet port 51, and if it is turned in the opposite direction the port *e'*, is brought into coincidence with the said port 51. In each case upon the preliminary movement of the valve the exhaust port is closed and after either port *e*, *e'*, is brought to coincide with the port 51, the motor fluid can pass from the pipe 39, through the port *e* or *e'*, and port *b'*, to the braking devices.

In case of accident to the means for supplying motor fluid to the braking devices I provide means for operating the latter by the power of the operator within the cage, as for instance a foot-bar 60, connected with the rock-shaft 10 so that the latter may be turned when the bar is depressed by the weight of the operator. Any suitable connecting means may be used, but as shown, the bar 60, is connected to a lever 61, pivoted to a bracket 62, and normally lifted to its upper position by a spring 63, and the lever 61, is connected with an arm 66, on the rock-shaft 10, by means of a connecting rod 64, having a slot to receive a pin 65, projecting from the arm 66, the said arm permitting the rocking movement of the shaft when the latter is turned by the power devices without interfering with the rocking of the shaft when the operator throws his weight upon the bar 60.

In order to avoid the objections to supplying the motor fluid through the medium of a long flexible pipe suspended within the well I prefer to carry upon the cage a reservoir containing a supply of motor fluid under pressure and to replenish this supply at intervals if required. One means of effecting this is by providing the elevating cage with a storage tank D', communicating with the pipe 39, as illustrated in Fig. 3, and an effective means of replenishing the tank is illustrated in Figs. 7 and 8. Thus, the tank is provided at one end with a downwardly projecting pipe 67, communicating with a

valve casing 68, containing a check valve 69, and from the lower end of said casing projects a nozzle 70, the said check valve serving when seated, to maintain the motor fluid under pressure in the tank D′.

At any suitable point near the bottom of the well is provided a valve casing I, having a central opening or socket *y*, with a flaring mouth and so arranged that when the cage A, descends the nozzle 70, will enter said mouth and depress a check-valve 71, which closes upward against a seat *w*, and which is lifted by a spring 72. The casing I, communicates with a pipe 73, supplying the motor fluid under pressure from a suitable source, as for instance a fixed storage tank J, and when the cage is in an elevated position the valve 71, closes against its seat *w*, and holds the fluid in the tank, but when the tank D′, upon the cage is to be replenished the operator permits the cage to descend below the normal limit of its downward motion so as to bring the nozzle 70, against the valve 71, opening the latter to permit the motor fluid to flow up through the nozzle, lift the valve 69, and pass through the pipe 67, into the tank D′. A gage *v*, is connected by a pipe 90, with the tank D′, and serves to indicate to the attendant the pressure in the tank D′, and when this is sufficient the attendant starts the cage upward when the lifting of the nozzle 70, will permit the valve 71, to take its seat and close the casing I, before the nozzle leaves the casing.

While I have referred to the casing in the well communicating with the motor fluid supply as being arranged at the lower end of the well it may be arranged in any position necessary to enable it to be brought in contact with the inlet pipe of the supply tank on the cage and any suitable connecting means may be employed to enable the fluid to pass from one to the other when the parts are in juxtaposition.

The term "braking devices" when used in this case refers to the brake shoes which engage with the friction plate or bar 16 and the parts which immediately carry them. It is to be understood that other equivalent devices come within the meaning of the term "braking devices" when employed.

Without limiting myself to the precise construction and arrangement of parts shown and described, I claim—

1. The combination with an elevator cage, of self-setting braking devices, a cylinder and piston carried by the cage, means for supplying the cylinder with motor fluid, connections between the piston and the braking devices arranged to loosen the brakes by the action of the motor fluid and means situated within the cage and under the control of the operator for controlling the flow of the motor fluid, substantially as set forth.

2. The combination with the elevator cage and the brakes therefor, of means which automatically and uniformly tend to force the brakes into operative position, an operating piston and cylinder connected with the brakes and arranged to release or move them out of operative position, and a tank containing a supply of liquid, communicating at one end with the cylinder and at the other end with a pipe for supplying motor fluid, substantially as set forth.

3. The combination with an elevator cage, of braking devices provided with springs constructed to apply the brakes with a power sufficient to arrest the movement of the cage, and a cylinder and piston carried by the cage, the piston connected to operate the brakes, and means whereby the operator within the cage can direct the motor fluid to the cylinder to move the piston and release the brakes, substantially as set forth.

4. The combination with an elevator cage and with vertical friction bars within the well, of friction brakes carried by the cage provided with springs arranged to apply the brakes to the friction bars, an engine carried by the cage and connected with the brakes, and means for supplying the engine with a motor fluid to release the brakes, substantially as set forth.

5. In an elevator apparatus the combination with the elevator cage, braking devices and a motor engine for operating the braking devices, of a valve connected with operating devices within the cage, and constructed to open the exhaust port of the motor engine when the valve is in mid-position and to open the inlet port when the valve is turned in either direction from a mid-position, substantially as set forth.

6. The combination with the elevator cage, the brake devices and a motor engine, connected with and arranged to operate the brake devices, of a valve device E having a casing provided with the inlet port 51 and the outlet port 50, a valve mounted within the casing and having the inlet ports *e*, *e′*, and the exhaust ports *b*, *b′*, fluid connections between the valve device and the motor engine and means for operating the valve device arranged to be under the control of the operator, substantially as set forth.

7. The combination with the braking devices carried by a cage, of a cylinder C, containing a piston connected with the braking devices, a tank D communicating with the cylinder C, through a pipe provided with a cock, a body of liquid in the cylinder C, and tank D, a pipe provided with a valve device, and communicating with the tank D and adapted to convey thereto a motor fluid which acts upon the said body of liquid, means for supplying the last said pipe with a motor fluid, and connections between the said valve device and an operating device within the cage, substantially as set forth.

8. The combination of the cage, its braking devices and motor engine and valve for the braking devices all arranged upon and carried by the cage, the elevator engine, its stopping and starting device, and an operating device

within the cage connected with both the stopping and starting device of the elevator engine and with the valve for the engine which operates the braking devices, substantially as set forth.

9. The combination with the elevator cage, of the friction brakes arranged in pairs on the opposite sides of the cage, each pair consisting of a fixed jaw, and a swinging jaw pivoted thereto, the fixed jaws being provided with bearings, a rock shaft mounted in the said bearings, and connected with the swinging jaws, and means under the control of the operator within the cage for positively operating the said rock shaft substantially as set forth.

10. The combination with the braking devices carried by an elevator cage, of a motor engine carried by the cage and provided with a valve controlling the flow of motor fluid, a storage tank D′, also carried by the cage and means connected with the said controlling valve and extending within the cage, whereby the operator can control the flow of the motor fluid to the said motor engine, substantially as set forth.

11. In an elevator apparatus the combination of a cage, braking devices, motor engine and storage tank provided with an inlet having a check valve and casing, and a pipe communicating with a motor fluid supply arranged in a fixed position in the well and provided with a casing having a check valve in position to make contact with the check valve casing carried by the tank of the cylinder, substantially as set forth.

12. In an elevator apparatus the combination with the elevator cage, its storage tank D′ and brake devices connected to be operated by the pressure of the motor fluid in the said tank, of a supply pipe arranged in a fixed position in the well, and means for connecting the supply pipe and storage tank when the cage is in one position, and valves for closing the supply pipe and storage tank, substantially as described.

13. In an elevator apparatus the combination with the elevator cage, of a storage tank having an inlet pipe with a projecting nozzle and check valve, and a casing arranged in the well in position to receive the nozzle, communicating with a supply pipe, and provided with a check valve, substantially as set forth.

14. The combination with a cage, of a tank carried thereby provided with an inlet pipe and check valve, and a casing communicating with a supply pipe and provided with a check valve arranged to be struck by the inlet pipe, substantially as set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

CYRUS W. BALDWIN.

Witnesses:
FREDERIC L. COBB,
WILLIAM RILEY.