No. 722,736. PATENTED MAR. 17, 1903.

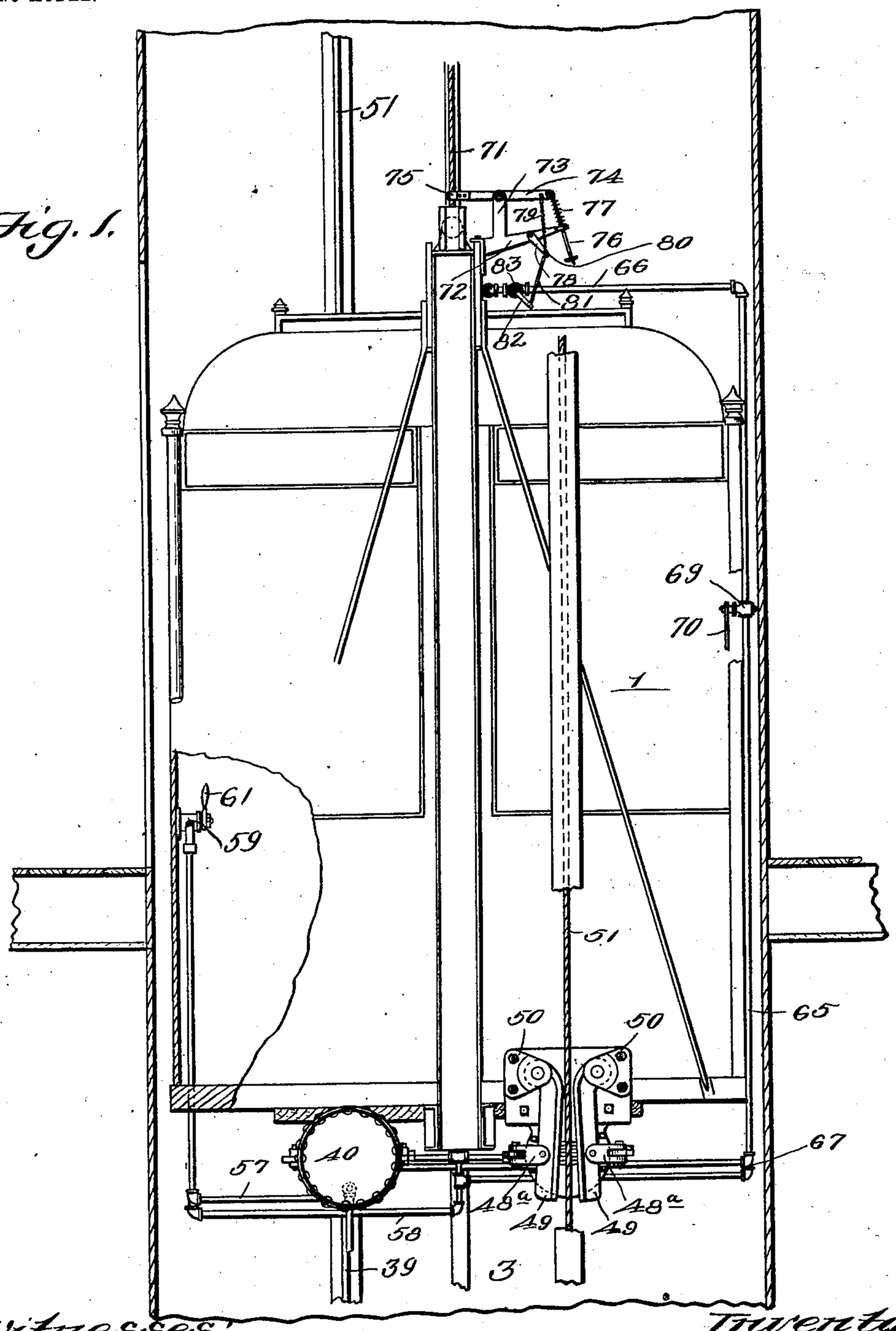
A. H. MEECH.

SAFETY DEVICE FOR ELEVATORS.

APPLICATION FILED JULY 24, 1901.

NO MODEL. 4 SHEETS—SHEET 1.

Fig. 1.



Witnesses:
C. D. Kesler

Inventor
Alfred H. Meech
By James L. Norris.
Atty.

No. 722,736. PATENTED MAR. 17, 1903.

A. H. MEECH.

SAFETY DEVICE FOR ELEVATORS.

APPLICATION FILED JULY 24, 1901.

NO MODEL. 4 SHEETS—SHEET 1.

Fig. 2.

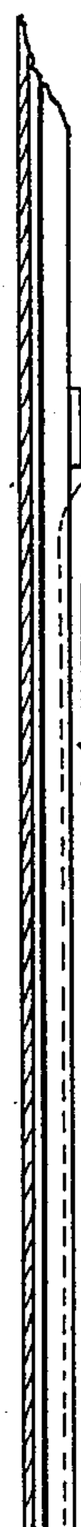
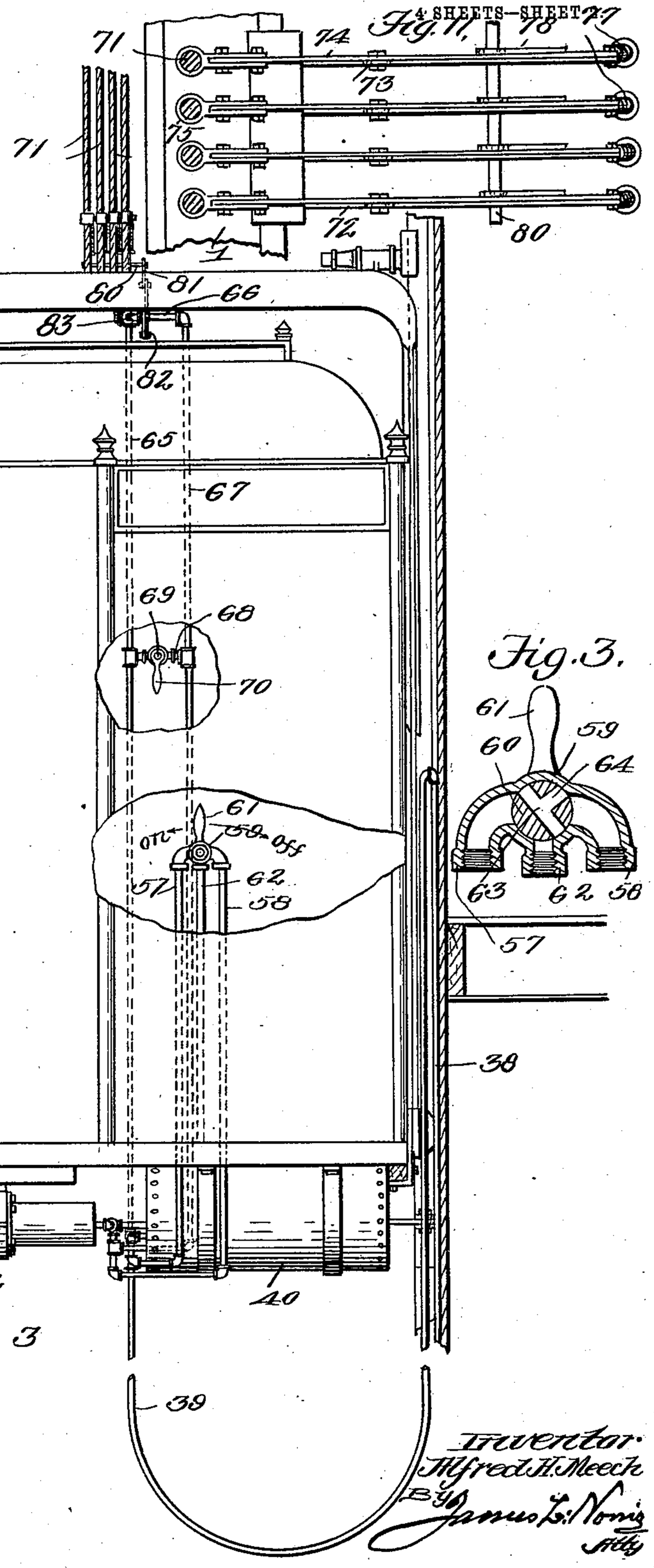


Fig. 1.



Witnesses:
C. L. Kesler.
H. C. Keller.

Inventor:
Alfred H. Meech
By James L. Norris
Atty

No. 722,736. PATENTED MAR. 17, 1903.

A. H. MEECH.

SAFETY DEVICE FOR ELEVATORS.

APPLICATION FILED JULY 24, 1901.

NO MODEL. 4 SHEETS—SHEET 3.

Fig. 4.

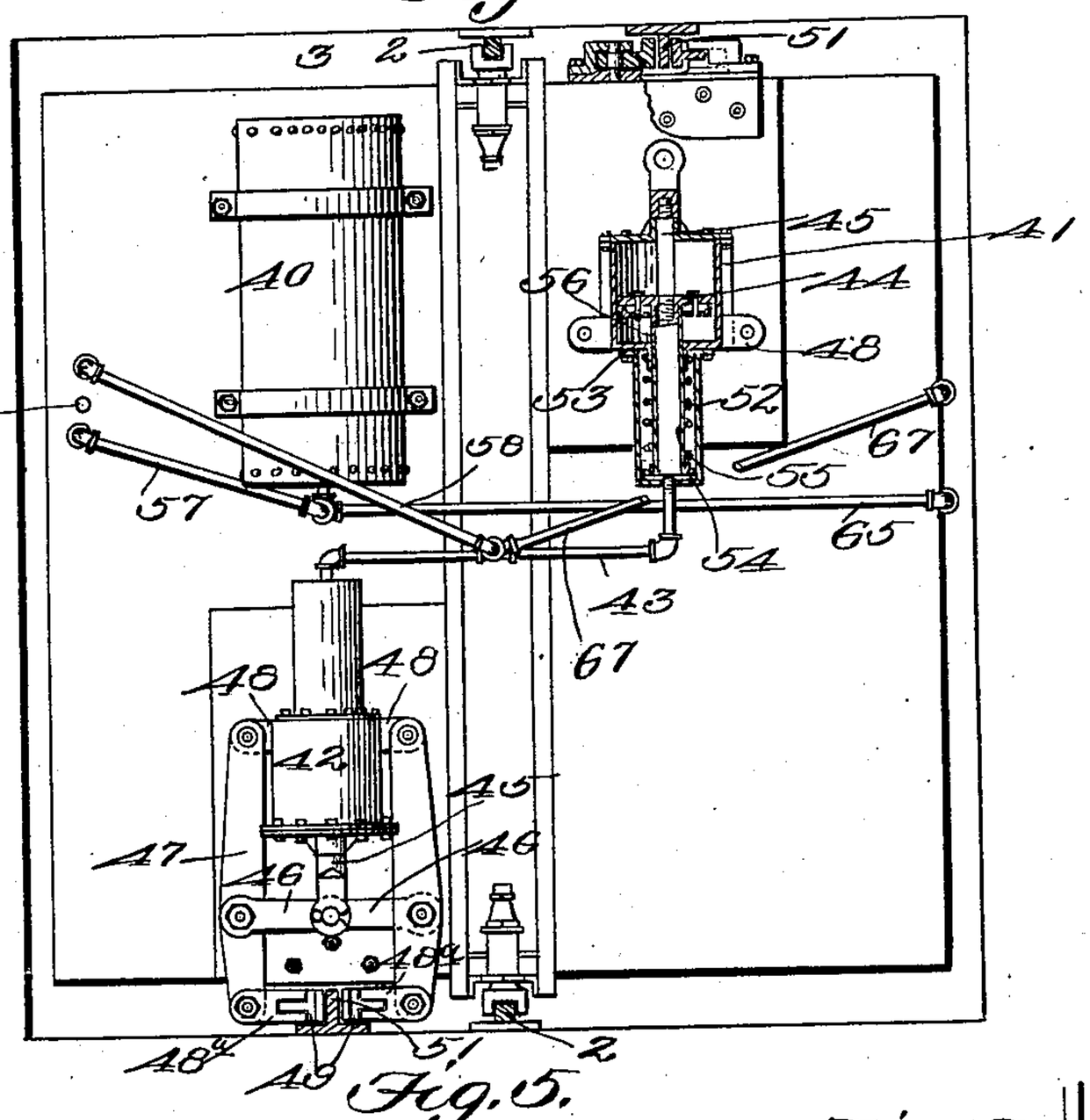


Fig. 5.

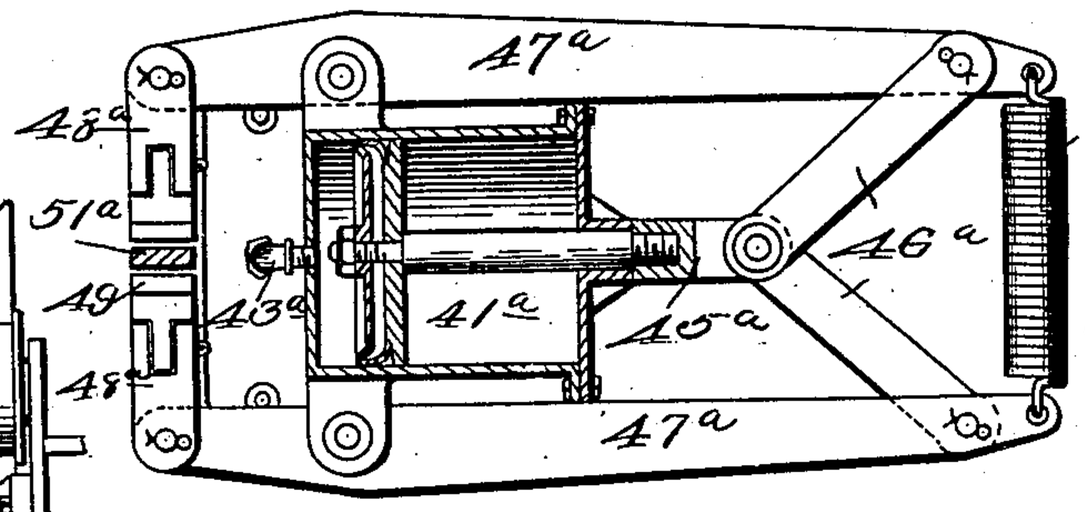


Fig. 6.

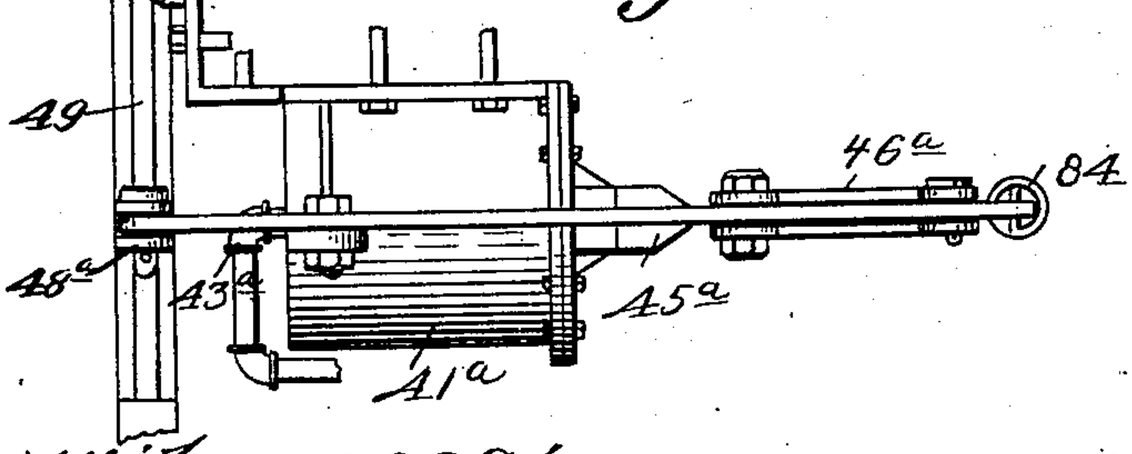
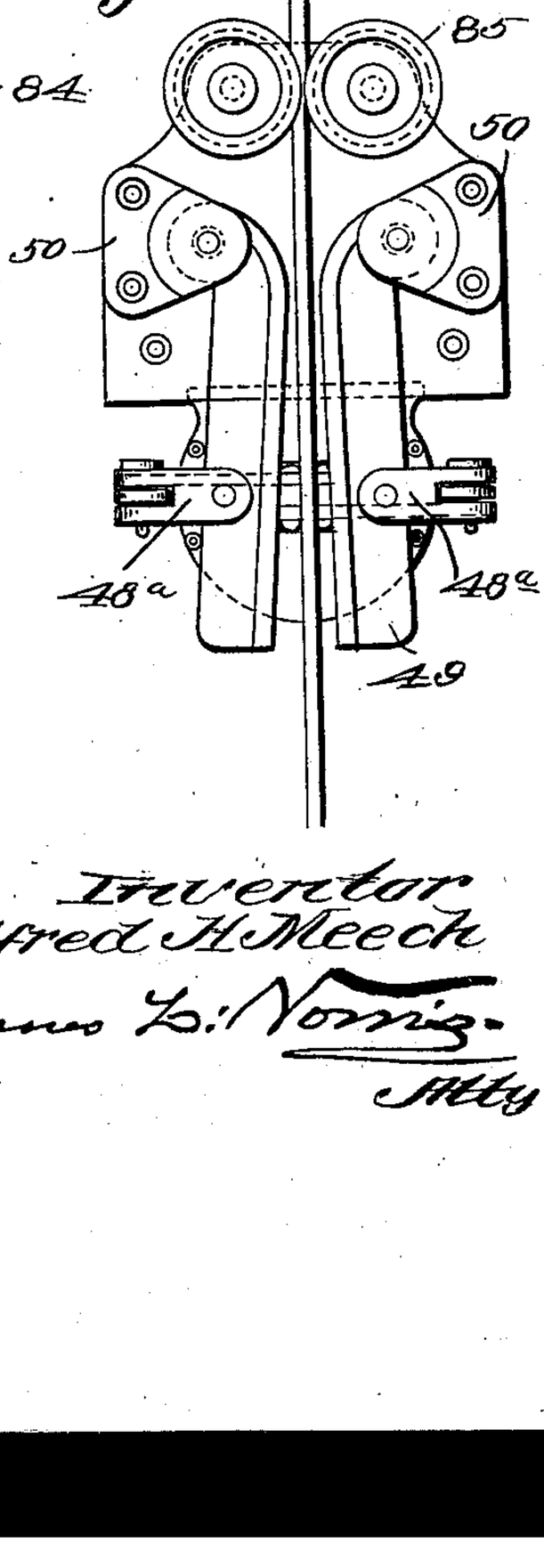


Fig. 7.



Witnesses;
C. D. Kesler.
J. W. Kesler

Inventor
Alfred H. Meech
By James L. Norris.
Atty

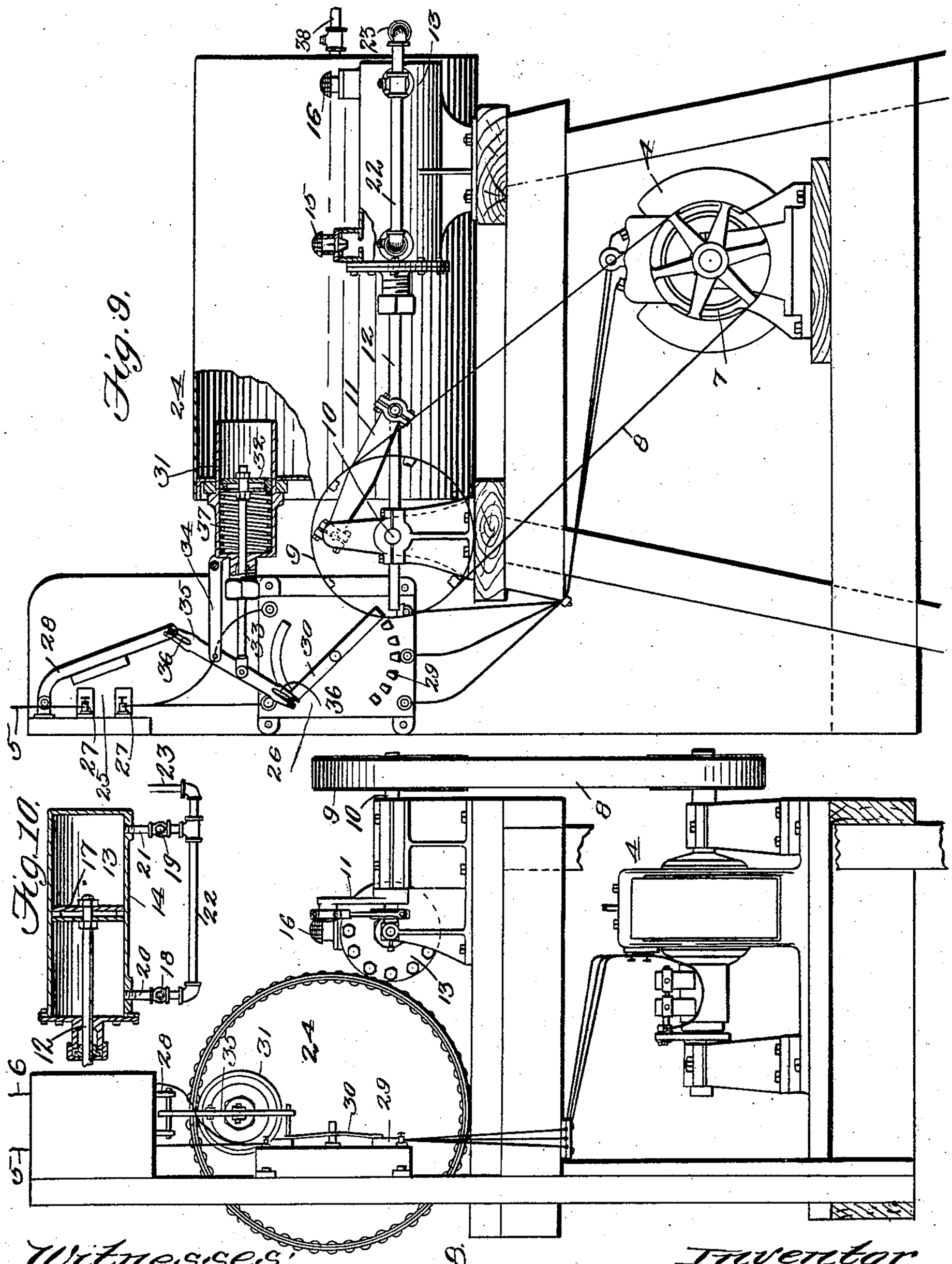
No. 722,736. PATENTED MAR. 17, 1903.

A. H. MEECH.

SAFETY DEVICE FOR ELEVATORS.

APPLICATION FILED JULY 24, 1901.

NO MODEL. 4 SHEETS—SHEET 4.



Witnesses:
E. L. Hesler

Inventor
Alfred H. Meech
By James L. Norris.
Atty.

UNITED STATES PATENT OFFICE.

ALFRED H. MEECH, OF CHATHAM, NEW YORK.

SAFETY DEVICE FOR ELEVATORS.

SPECIFICATION forming part of Letters Patent No. 722,733, dated March 17, 1903.

Application filed July 24, 1901. Serial No. 69,595. (No model.)

To all whom it may concern:

Be it known that I, ALFRED H. MEECH, a citizen of the United States, residing at Chatham, in the county of Columbia and State of New York, have invented new and useful Improvements in Safety Devices for Elevators, of which the following is a specification.

My invention relates to safety devices for elevators, the object of the same being to provide novel means independent of the propelling means for the elevator whereby the movement thereof may be arrested effectually and with absolute certainty in case of accident.

A further object of the invention is to provide means adapted to be thrown into operation by the attendant or by a passenger or occupant of the car and automatically for quickly applying the brakes with sufficient power to instantly arrest the movement of the car.

A further object of the invention is to provide a novel construction of brake which is normally held out of engagement with the rail or other stationary part with which it coacts, so that rubbing or abrading and wear of these parts are effectually avoided.

Other objects and advantages of the invention will hereinafter appear, and the novel features thereof will be set forth in the claims.

In the drawings forming part of this specification, Figure 1 is a sectional elevation illustrative of my invention. Fig. 2 is a similar view taken at right angles to Fig. 1. Fig. 3 is a detail sectional view of the three-way valve employed. Fig. 4 is a bottom plan view of the car. Fig. 5 is a sectional view of one of the brake-cylinders, showing in elevation the connections between the same and the brake-shoes. Fig. 6 is a side elevation of the same. Fig. 7 is a similar view of the brak-shoes and the parts connected therewith. Fig. 8 is an end view of the main compressed-air reservoir, the compressor, and the motor for actuating the latter. Fig. 9 is an elevation of the same, taken at right angles to Fig. 8. Fig. 10 is a sectional detail, and Fig. 11 is a detail plan view.

Like reference-numerals indicate like parts in the different views.

I have illustrated in the drawings a car or cage 1, mounted to slide on the ordinary guide-rails 2 on opposite sides of the shaft 3 and propelled in any suitable manner. At the bottom of the shaft 3 is mounted upon a suitable support an electric motor 4, of any suitable or preferred construction, the same being supplied with current for operating the same through the wires 5 6, connected with the opposite poles of a generator or other suitable source of electric supply. Connected with the armature-shaft of the motor 4 is a pulley 7, around which passes a driving-belt 8, the said belt also passing around a pulley 9 on a crank-shaft 10, mounted in suitable bearings, as shown. Connected with the shaft 10 through the medium of a pitman 11 is a horizontally-movable piston-rod 12 of an air-compressor 13. The said compressor may be of any suitable or preferred construction; but I have shown the same as a double-acting compressor, the same consisting of a cylinder 14, having inlet-openings at its opposite ends controlled by the drop-valves 15 16 and having a piston 17 therein connected with the piston-rod 12. Leading from the compressor 13, at opposite ends thereof, and provided with outwardly-opening check-valves 18 19 are the pipes 20 and 21, the same being connected together by a coupling-pipe 22 and communicating through a pipe 23 with a main air-reservoir 24. From the foregoing description it will be noted that during the operation of the motor 4 the compressor 13 through the connections described will be operated and the reservoir 24 will be charged with air under pressure.

It is designed that a pressure of seventy pounds to the square inch shall be maintained in the reservoir 24, and in order to stop the operation of the motor 4 automatically when this pressure in the reservoir 24 is reached and to start the same automatically when the pressure in said reservoir falls below that at which it is desired to maintain the same I connect the circuit-wire 5 with the motor 4 through a knife-switch 25 and a rheostat 26. The switch 25 is made up of the contact-springs 27 and the pivoted switch-lever 28, designed to bridge the circuit between said springs 27. The rheostat 26 may be of any suitable form and construction, the same being provided, as usual, with the contacts 29 and the lever 30, designed to engage said con-

tacts and to throw a greater or less amount of resistance into the circuit. Secured to one end of the main air-reservoir 24 and communicating with the interior thereof is a cylinder 31, having a piston 32 and a piston-rod 33, leading outwardly therefrom. Pivoted to the cylinder 31 is an arm 34, which serves as a fulcrum for a floating lever 35, having a loose connection by way of the elongated slots 36 in its outer ends with the levers 28 and 30, respectively. The piston-rod 33 is also connected with the floating lever 35, as shown. Surrounding the piston-rod 33 within the cylinder 31 and acting upon the piston 32 is a coil-spring 37, whose normal tendency is to force the piston 32 to its innermost position. The spring 37 is so adjusted that its tension will be overcome by the pressure in the reservoir 24 at which it is designed to maintain the air therein. Assuming that the pressure at which it is desired to maintain the air in the reservoir is seventy pounds to the square inch, it will be obvious that when the apparatus is first installed and there is no pressure in the reservoir 24 beyond atmospheric pressure the piston 32 will occupy a position at the innermost end of the cylinder 31, at which time the switch-lever 28 will bridge the space between the contact-springs 27, and the circuit through the wires 5 6 will be closed to the motor 4. The said motor will then be in operation and through the connections described will operate the compressor 13, which will force air under pressure through the pipes 20, 21, and 23 into the reservoir 24. When the pressure in said reservoir is sufficient to force outwardly the piston 32, the floating lever 35 will be shifted on its fulcrum on the arm 34, so as to move the switch-lever 28 and the lever 30 to the positions shown. This action will break the circuit through the wire 5 at the switch 25, and the motor 4 will be instantly thrown out of operation. When the pressure in the reservoir 24 falls below that at which it is desired to maintain the same, the spring 37, acting upon the piston 32, will force the latter inwardly and rock the floating lever 35, so as to move the switch-lever 28 into contact with the springs 27 of the switch 25 and gradually cut out the resistance in the rheostat 26. The circuit through the motor 4 will then be closed, the latter will be thrown into operation, and the same will continue to operate until the pressure in the reservoir 24 reaches a point sufficient to overcome the tension of the spring 37. It will thus be seen that by the means described provision is made for maintaining the pressure in the main compressed-air reservoir 24 constant at all times.

Leading from the main air-reservoir 24 and extending upwardly therefrom along one side of the shaft 3 is a rigid supply-pipe 38, which is connected through a flexible coupling-pipe 39 with an auxiliary air-reservoir 40, mounted upon the under side of the car 1. Also secured to the under side of the car 1 are two brake-cylinders 41 42, the same being connected together at their inner ends by a pipe 43. Within each of the cylinders 41 42 is a piston 44, whose piston-rod 45 extends outwardly from the end thereof opposite that at which the pipe 43 enters the same and is connected by a toggle-joint made up of the links 46 46 with the brake-operating levers 47 47. The levers 47 are fulcrumed upon lugs 48 on opposite sides of the brake-cylinders 41 42 and are pivotally connected through the links 48^a with the brake-shoes 49. The said brake-shoes are mounted in upright position, being pivoted to and suspended from the brackets 50, secured to the sides of the car. Coöperating with each pair of the brake-shoes 49 on opposite sides of the shaft 3 is a T-rail 51, which is vertically disposed and located parallel to the guide-rails 2, on which the car 1 moves. Said shoes, however, are normally held out of engagement with the rails 51, so that no rubbing or abrading and consequent wear of either of these parts are brought about during the ordinary use of the elevator. To normally maintain the brake-shoes 49 in the position described and to return the piston 44 of each of the brake-cylinders 41 42 to its normal position after it has been once actuated, I locate within each of the brake-cylinders a stiff coil-spring 52, each spring bearing at one end against a rigid plate 53 and at its opposite end against a bead, shoulder, or collar 54 on the hollow tubular extension 55 of the piston 44. The said tubular extension 55 of the piston 44 is provided with lateral openings 56, by means of which the compressed air entering one end of the brake-cylinder may pass through said hollow tubular extension to act upon the rear face of the piston therein. It will be seen by this construction that the springs 52 tend to hold each of the pistons 44 of the brake-cylinders 41 42 at one end of the stroke thereof, and when in this position the brake-shoes 49 are out of contact with the rails 51.

It will be understood, of course, that instead of the T-rail 51, with which the brake-shoes 49 coöperate, I may employ a flat or round cable or any other equivalent device extending longitudinally of the shaft 3. Where the term "rail" is used, therefore, in the following claims I intend the same to include either the particular form of T-rail herein shown or any equivalent thereof. It will also be obvious that instead of employing separate rails 51 for the brake-shoes 49 I may utilize the ordinary guide-rails 2. I prefer to employ separate rails 51, however, as more effective action of the brake-shoes thereon may be obtained owing to the fact that no lubrication of the rails 51 is necessary, whereas it is necessary that the guide-rails 2 on which the car 1 moves shall be constantly lubricated. Furthermore, I may secure such strength in the rails 51 as may not be obtainable when the guide-rails 2 are of ordinary construction.

Leading from the auxiliary reservoir 40 and extending upwardly into the car 1 is a pipe 57, and leading upwardly into the car from the connecting-pipe 43 between the brake-cylinders 41 42 is a pipe 58. The pipes 57 and 58 terminate at their upper ends in a valve-casing 59, in which is mounted a three-way valve 60, controlled by an arm or handle 61. Leading from the valve-casing 59, preferably between the pipes 57 and 58, is an exhaust-pipe 62, which communicates with the atmosphere at a point below the floor of the car 1. The three-way valve 60 may be of the ordinary form and construction, the same being provided with a port 63, extending transversely of the same and designed to open communication between the pipes 57 and 58, and with a port 64, extending at right angles to the port 63 and designed in connection with said port to open communication between the exhaust-pipe 62 and one or the other of the pipes 57 58. The valve 60 is designed to be operated by the car attendant in case of accident to the ordinary propelling means for the car and is located within convenient reach of said attendant. The normal position of the same is as shown in the drawings, the passages between the pipes 57, 58, and 62 being all cut off. In case of accident the handle 61 of the valve is turned in the direction marked "On," when the port 63 in said valve is thrown in line with the pipes 57 and 58, and communication is established between the auxiliary reservoir and both of the brake-cylinders 41 and 42 over the following path: pipe 57, port 63, pipe 58, and pipe 43, connected with both of the brake-cylinders 41 and 42. Assuming that the air-pressure in the reservoir 40 is at seventy pounds to the square inch and that the diameter of each of the pistons 44 is eight inches, a pressure of approximately thirty-five hundred pounds will be instantly applied behind each of the pistons 44 in the brake-cylinders 41 42, which will move said pistons outwardly against the action of the springs 52, and through the toggle-joint connection 46 of the piston-rods 45 with the brake-actuating levers 47 the brake-shoes 49 will be forced inwardly into close engagement with the rails 51 with sufficient force to quickly stop the movement of the heaviest car. The action of the brakes is therefore instantaneous and with sufficient power to effectually prevent the danger of accident due to falling of the car. The brakes will remain applied as long as the valve 60 remains in the position to which it was turned. To release the brakes from their engagement with the rails 51, it is merely necessary to turn the handle 61 of the valve 60 to the position marked "Off," when communication between the pipes 57 and 58 will be broken and communication between the pipes 58 and 62 established. The air supplied from the auxiliary reservoir 40 to the brake-cylinders 41 and 42 may now escape over the following path: pipe 43, pipe 58, ports 64 and 63 of the valve 60, and pipe 62 to atmosphere. When thus relieved, the springs 52 return the pistons 54 of each of the brake-cylinders 41 42 to their normal positions, which action serves, as is obvious, to release the brake-shoes 49 from their engagement with the rails 51.

The mechanism just described is that which is designed for use by the elevator attendant and is entirely independent of and disconnected from the ordinary mechanism operated by the attendant for causing the elevation and lowering of the car. In the event, therefore, of any accident to the propelling means for the car the attendant knows that he always has a reserve means for throwing into operation the brakes and arresting the downward or upward movement of the car. While the means referred to is simple, consisting merely in moving the valve 60 in one direction or the other, it requires some little education on the part of the attendant, as it is necessary for him to know which way the handle 61 of the valve 60 should be turned. Accidents sometimes happen when the attendant is temporarily absent from his place in the car. In order to provide simple means, therefore, whereby the brakes may be thrown into operation by a passenger or occupant of the car independently of the operator, I lead from the auxiliary reservoir 40 a pipe 65, which extends upwardly along one side of the car, projects above the roof of the car, and has a horizontal coupling-piece 66 thereon, which connects the same with the downwardly-extending pipe 67, parallel to the pipe 65 and communicating with the connecting-pipe 43 between the two brake-cylinders 41 and 42. Intermediate the ends of the pipes 65 and 67 the same are connected by a cross-pipe 68, in which is mounted a normally closed two-way valve 69, having an operating-handle 70 thereon. By moving the handle 70 in either direction communication is established between the pipes 65 and 67, and the brake-cylinders 41 and 42 are supplied with compressed air from the auxiliary reservoir 40 over the following path: pipe 65, port of valve 69 in the pipe 68, pipe 67, and connecting-pipe 43 to both of the cylinders 41 42. The brakes 49 are thereby instantly thrown into operation in the manner heretofore described. When it is desired to restore the brakes to their normal inoperative positions, it is merely necessary to turn the valve 69 to cut off the communication between the pipes 65 and 67 and to move the handle 61 of the valve 60 to the position marked "Off," when communication will be established between the pipe 58 and the exhaust-pipe 62, and the compressed air in the cylinders 41 42 will be allowed to escape and the pistons 44 and the brake-shoes connected therewith will be retracted and returned to their normal inoperative positions through the action of the springs 52. It will be seen from the foregoing description that in addition to the means for throwing the brake into operation, which is controlled by the at-

tendant and requires some little education, I have provided additional means adapted to be operated by a passenger or occupant of the car which requires no education whatever. Notices may be placed in each car supplied with my invention adjacent to the valve 69 indicating the fact that in case of accident the movement of the car may be arrested by turning the lever 70 in either direction.

The two mechanisms above described for operating the brakes require the manipulation of certain parts by the attendant or a passenger. In addition to these I provide means whereby the brakes may be applied and the movement of the car arrested automatically when any one or more of the hoisting-ropes of the car become broken. I have illustrated in the drawings four hoisting-ropes 71, each connected with the car 1 in any suitable manner. It will be obvious, however, that a greater or less number of these hoisting-ropes may be employed without departing from my invention. Secured to the upper end of the car are brackets 72, one for each of the hoisting-ropes 71, each of the same being provided with an upright or standard 73, in which is fulcrumed a lever 74. One end of the lever 74 is provided with a ring or clip 75, which embraces one of the hoisting-ropes 71 and is connected therewith, while the other end of the lever 74 has pivoted thereto a guide-arm 76, which passes through an opening in the free end of the bracket 72 and has surrounding it a coil-spring 77, which tends normally to elevate the outer end of the lever 74 and to depress the inner end thereof, which carries the clip or ring 75. The upward movement of the free end of the lever 74 is prevented by the engagement of the clip 75 with the hoisting-rope 71, the said hoisting-rope being stretched taut and preventing any rocking movement of said lever. On each of the brackets 72 is pivoted an arm 78, connected by a chain 79 or other flexible medium with the lever 74, and the free ends of each of the arms 78 are connected together by means of a horizontal rod 80. This rod 80 is connected, through the rod 81, with the operating-handle 82 of a normally closed two-way valve 83 in the coupling 66 between the pipes 65 and 67. Now it will be obvious that when the free end of any one of the levers 74 is elevated through the action of the spring 77, which is connected therewith, the free end of the pivoted arm 78, through the chain 79, will also be elevated. When this action takes place, the valve 83 will be turned, through the medium of the rod 81 and the handle 82, so as to open communication between the pipes 65 and 67. When this communication is open, the brake-cylinders 41 and 42 will be supplied with air under pressure from the auxiliary reservoir 40 and the brakes 49 instantly applied, the flow of air being over the following course: pipe 65, coupling 66, and port of valve 83 therein, pipe 67, and connecting-pipe 43 to both of said brake-cylinders. As heretofore stated, each of the levers 74 is maintained inoperative in the position shown by means of the engagement of the clip 75 with the hoisting-rope 71. If any one of the hoisting-ropes 71 should break either above or below the clip 75, the particular lever 74 which was connected with said hoisting-rope would be free and the spring 77 thereof would raise the outer end of said lever and depress the lower end thereof and open the valve 83, thereby actuating the brakes 49 in the manner just described. It will thus be seen that in the event of the breakage of any one or more of the hoisting-ropes 71 the brakes 49 will be automatically thrown into operation instantly and with sufficient power to arrest the downward movement of the car. In all conditions under which accidents would ordinarily occur on an elevator, therefore, means have been provided by me for effectually preventing the same.

Instead of forming the brake-cylinders 41 and 42 with an extension in which the springs 52 are located and instead of connecting the piston-rods 45 of the pistons 44 with the brake-actuating levers 47 in the manner heretofore described I may supply the compressed air or working fluid to one end of the cylinder 41^a through the supply-pipe 43^a at the end thereof adjacent to the brake-shoes 49 and connect the brake-actuating levers 47^a at their rear ends by a spring 84, which spring serves normally to hold the brake-shoes 49 out of contact with the rail 51. In this form of my invention the brake-actuating levers 47^a are fulcrumed upon the sides of the cylinder 41^a at points intermediate their ends, the longer arms of said levers being those which are connected together by the spring 84. A greater leverage may thereby be obtained and a greater power exerted upon the brake-shoes 49. The piston-rod 45^a has a toggle-joint connection through the links 46^a with the levers 47^a adjacent to the spring 84, so that when said piston-rod 45^a is forced outwardly the long arms of the levers 47^a are spread apart or expanded, so as to force the opposite ends thereof, which carry the brake-shoes 49, inwardly. The springs 84 serve to resist the outward movement of the long arms of the levers 47^a and also serve to return the brake-shoes 49 to their normal inoperative positions as soon as the pressure within the cylinder 41^a is relieved. I have shown this form of my invention in connection with a rope or cable 51^a, with which the brake-shoes 49 are adapted to coöperate. It may be found desirable when using the cable 51^a, which is liable to sway back and forth, to provide guide-rollers 85 on opposite sides of said cable to maintain the latter at all times in a position out of engagement with the adjacent surfaces of the brake-shoes 49, and thereby prevent rubbing or abrading and consequent wear of either said cable or said brake-shoes.

I have throughout the specification referred to the brakes as being thrown into operation by compressed air. It is obvious, however,

that instead of compressed air I may employ any other expansive fluid in the same manner, and while my apparatus is particularly designed for the use of air under pressure I desire it to be distinctively understood that my invention is not limited to the use of this particular medium, but other media may be employed.

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

1. In a safety device for elevators, a brake, pneumatic hand-operated and automatic means for throwing the same into operation, the said automatic means being actuated independent of the movement of the car.

2. In a safety device for elevators, a brake, pneumatic means for automatically throwing said brake into operation, and means independent of the movement of the car for actuating said pneumatic means.

3. In a safety device for elevators, a brake, pneumatic means for throwing said brake into operation, and separate hand and automatic means for actuating said pneumatic means and thereby throwing said brake into operation, the said automatic means being independent of the movement of the car.

4. In a safety device for elevators, a brake, pneumatic means independent of the propelling means for the car for throwing said brake into operation, and hand and automatic means independently connected to said pneumatic means and adapted to be operated independent of the movement of the car for actuating said pneumatic means.

5. In a safety device for elevators, a brake, a brake-cylinder carried by the car through which said brake is operated, a reservoir for compressed air, a plurality of independent connections between said reservoir and said cylinder, and a valve in each of said connections for controlling the passage therethrough.

6. In a safety device for elevators, a brake, a brake-cylinder carried by the car through which said brake is operated, a reservoir for compressed air, a plurality of independent connections between said reservoir and said cylinder, a valve-casing in one of said connections having an exhaust-port therein, a three-way valve in said casing controlling the passages between the two parts of said connection and said exhaust-port, and a two-way valve in the other of said connections.

7. In a safety device for elevators, a brake, a brake-cylinder carried by the car, a piston in said cylinder operatively connected with said brake for applying the brake when air is supplied to said cylinder, a reservoir for compressed air also carried by the car, a pipe connected with said reservoir and leading into the car, a pipe connected with said cylinder and leading into the car, a valve-casing connecting said pipes, having an exhaust-port therein, and a three-way valve in said casing controlling the passages between said pipes and said exhaust-port, whereby the brake may be positively applied by the direct action of the air on said piston.

8. In a safety device for elevators, a brake, a brake-cylinder carried by the car, through which said brake is operated, a reservoir for compressed air carried by the car, a pipe connected with said reservoir and leading into the car, a pipe connected with said cylinder and leading into the car, a valve-casing connecting said pipes, having an exhaust-port therein, a three-way valve in said casing controlling the passages between said pipes and said exhaust-port, a second pipe connected with said reservoir and leading into the car, a second pipe connected with said cylinder and leading into the car, connections between the latter pipes, and a two-way valve therein.

9. In a safety device for elevators, a brake, a brake-cylinder carried by the car, through which said brake is operated, a reservoir for compressed air carried by the car, a pipe connected with said reservoir and leading into the car, a pipe connected with said cylinder and leading into the car, a valve-casing connecting said pipes, having an exhaust-port therein, a three-way valve in said casing controlling the passages between said pipes and said exhaust-port, a second pipe connected with said reservoir and leading into the car, a second pipe connected with said cylinder and leading into the car, connections between the latter pipes, a two-way valve therein, a second connection between the latter pipes, a valve therein, and means automatically thrown into operation by a breakage of one of the hoisting-ropes for actuating the latter valve.

10. In a safety device for elevators, a brake, a brake-cylinder carried by the car through which said brake is operated, means for supplying compressed air to said cylinder, pipes leading respectively from said cylinder and from the source of supply of compressed air, a valve controlling the passage between said pipes, and means automatically thrown into operation by a breakage of the hoisting-rope and independent of the movement of the car for actuating said valve.

11. In a safety device for elevators, a brake, a brake-cylinder carried by the car, through which said brake is operated, a reservoir for compressed air also carried by the car, pipes leading respectively from said cylinder and from said reservoir, a valve controlling the passage between said pipes, and means automatically thrown into operation by a breakage of the hoisting-rope for actuating said valve.

12. In a safety device for elevators, a brake, a brake-cylinder carried by the car, through which said brake is operated, a reservoir for compressed air also carried by the car, pipes leading respectively from said cylinder and from said reservoir, a valve controlling the passage between said pipes, a bracket carried by the car, a lever fulcrumed on said bracket and connected with the hoisting-rope, a spring

acting upon said lever and tending to rock the same, and connections between the said lever and said valve, whereby when said hoisting-rope breaks said lever will be rocked and said valve actuated.

13. In a safety device for elevators, a brake, a brake-cylinder carried by the car, through which said brake is operated, a reservoir for compressed air also carried by the car, pipes leading respectively from said cylinder and from said reservoir, a valve controlling the passage between said pipes, a bracket mounted on said car, a lever fulcrumed on said bracket and having one end thereof connected with the hoisting-rope, a spring acting upon the opposite end of said lever for elevating the same, and a flexible connection between said lever and the handle of said valve, whereby when said hoisting-rope breaks the outer end of said lever will be elevated and said valve will be actuated.

14. In a safety device for elevators, a brake, a brake-cylinder carried by the car, through which said brake is operated, a reservoir for compressed air also carried by the car, pipes leading respectively from said cylinder and from said reservoir, a valve controlling the passage between said pipes, a plurality of brackets carried by the car, one for each of the hoisting-ropes, levers fulcrumed upon said brackets and having clip connections at one end with the respective hoisting-ropes, springs acting upon the opposite ends of said levers for normally urging the same upwardly, arms pivoted to said brackets, a rod connecting the free ends of said arms, flexible connections between each of said levers and said rod, and connections between said rod and said valve, whereby when any one or more of said hoisting-ropes breaks the lever or levers connected therewith will be rocked, said rod will be elevated and said valve actuated.

15. In a safety device for elevators, the combination with a brake-cylinder and means for supplying air under pressure thereto, of a pair of pivoted brake-shoes, a stationary part with which said shoes are adapted to coöperate, brake-actuating levers fulcrumed to a stationary part, a link connection between said levers and said shoes, and a toggle-joint connection between the piston of said cylinder and said levers.

16. In a safety device for elevators, the combination with a brake-cylinder and means for supplying air under pressure thereto, of a pair of pivoted brake-shoes, a stationary part with which said shoes are adapted to coöperate, means for normally maintaining said shoes and said stationary part out of engagement one with the other, brake-actuating levers fulcrumed to a stationary part, a link connection between said levers and said shoes, and a toggle-joint connection between the piston of said cylinder and said levers.

17. In a safety device for elevators, the combination with a brake-cylinder and means for supplying air under pressure thereto, of a pair of pivoted brake-shoes, a stationary part with which said shoes are adapted to coöperate, a piston in said cylinder, a spring acting on said piston in opposition to the air-pressure in the cylinder, brake-actuating levers fulcrumed to a stationary part, a link connection between said levers and said shoes, and a toggle-joint connection between said piston and said levers.

18. In a safety device for elevators, the combination with a brake-cylinder and means for supplying air under pressure thereto, of a pair of pivoted brake-shoes, a stationary part with which said shoes are adapted to coöperate, a piston in said cylinder having a tubular extension thereon provided with ports or openings and lying adjacent to the inlet-port of said cylinder, a coil-spring surrounding said extension acting upon a shoulder thereon and upon a stationary part in said cylinder, brake-actuating levers fulcrumed to a stationary part and connected with said shoes, and a toggle-joint connection between said piston and said levers.

19. In a safety device for elevators, the combination with a brake-cylinder secured to the under side of the car and horizontally disposed, and a reservoir for compressed air also secured to the under side of the car and having a valved connection with said cylinder, of a pair of upright, pivotally-suspended brake-shoes carried by the car, a stationary part with which said shoes are adapted to cooperate, a pair of horizontally-disposed brake-actuating levers fulcrumed to a stationary part and having pivotal connections at their free ends with said brake-shoes, a toggle-joint connection between the piston of said cylinder and said levers, and a spring for normally maintaining said brake-shoes out of contact with the stationary part with which they coöperate.

20. In a safety device for elevators, the combination with a brake, a brake-cylinder through which said brake is operated, an auxiliary reservoir, a connection between said reservoir and said cylinder, a valve in said connection, and means inside the car for operating said valve, all of said parts being carried by the car, of a main stationary compressed-air reservoir, means for supplying air under pressure thereto, a stationary supply-pipe leading from said main reservoir, and a flexible connection between said pipe and the auxiliary reservoir on the car.

21. In a safety device for elevators, the combination with a brake, a brake-cylinder through which said brake is operated, an auxiliary reservoir, a pipe connecting said reservoir and said cylinder, a valve-casing in said pipe having an exhaust-port therein, a three-way valve in said casing, and means inside the car for operating said valve, of a main compressed-air reservoir, and permanent connections between said main and auxiliary reservoirs.

22. In a safety device for elevators, the

combination with a brake, a brake-cylinder through which said brake is operated, an auxiliary reservoir, and a plurality of valved connections between said reservoir and said cylinder, of a main compressed-air reservoir, and permanent connections between said main and auxiliary reservoirs.

23. In a safety device for elevators, the combination with a brake, a brake-cylinder through which said brake is operated, an auxiliary reservoir, and a plurality of valved connections between said reservoir and said cylinder, of a main stationary compressed-air reservoir, a stationary supply-pipe leading from said main reservoir, and a flexible connection between said pipe and the auxiliary reservoir.

24. In a safety device for elevators, the combination with a brake, a brake-cylinder through which said brake is operated, an auxiliary reservoir, pipe connections between said reservoir and said cylinder, a hand-operated valve and an automatic valve in said connections, all of said parts being carried by the car, of a main compressed-air reservoir, a stationary supply-pipe leading therefrom, a flexible pipe connecting said stationary pipe with said auxiliary reservoir, whereby a permanent air connection is maintained between said main reservoir and said auxiliary reservoir, a compressor discharging into said reservoir, a motor for operating said compressor, and means thrown into operation by a decrease in the consumption of air, brought about either by leakage or by the application of the brake, for automatically starting or stopping said motor, whereby a permanent supply of air under pressure for the operation of the brake is maintained at all times and at all points of travel of the elevator-car.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

ALFRED H. MEECH.

Witnesses:
WM. M. STOCKBRIDGE,
W. H. CLARKE.