W. R. ELLIOTT.

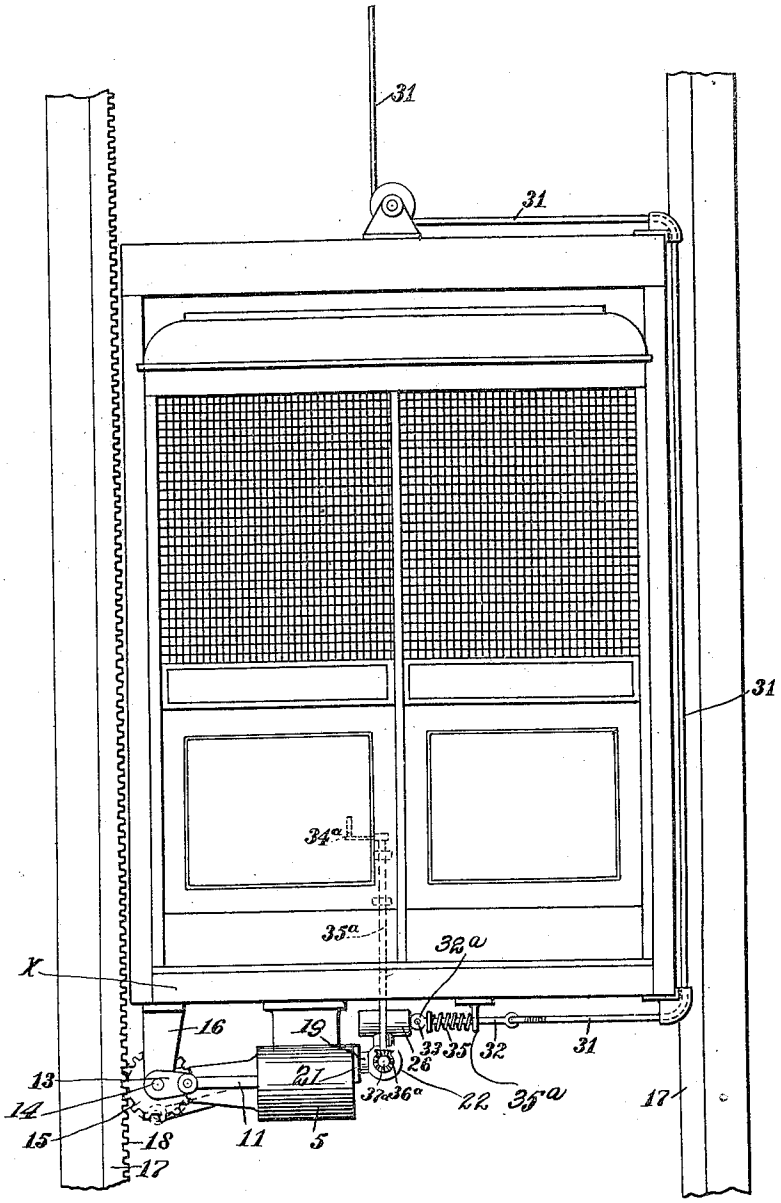
BRAKE FOR ELEVATORS.

APPLICATION FILED MAY 12, 1909.

949,526. Patented Feb. 15, 1910.

2 SHEETS—SHEET 1.

Fig. 1



WITNESSES,

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2 SHEETS—SHEET 2.

Fig. 2.

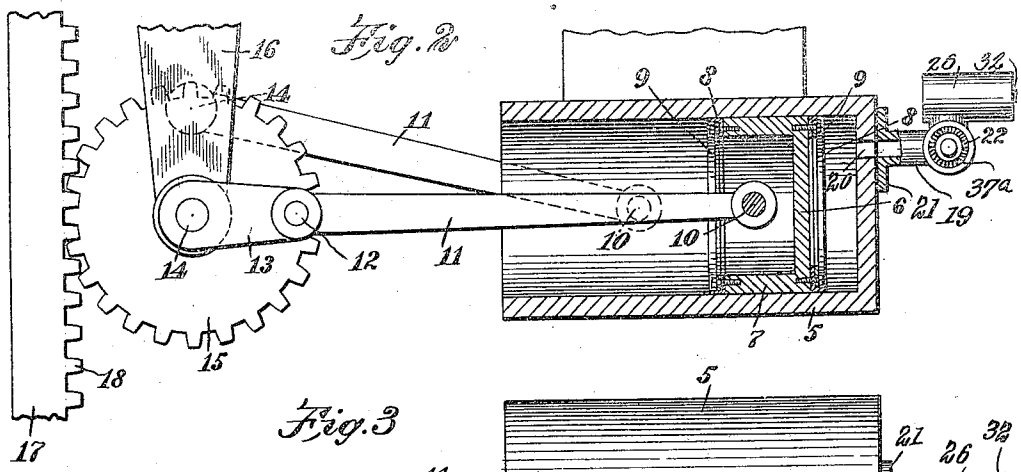


Fig. 3.

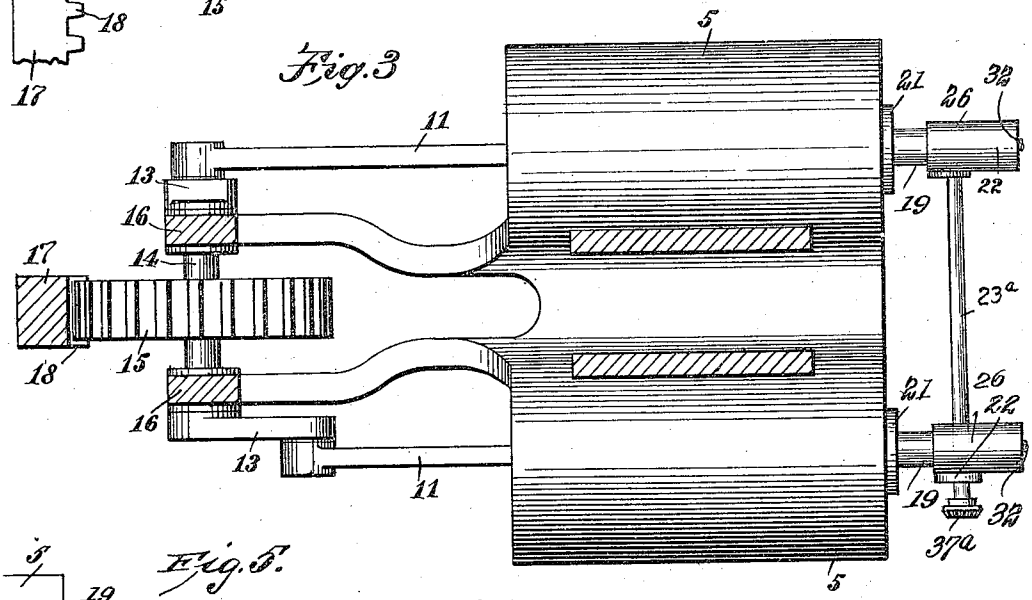


Fig. 5.

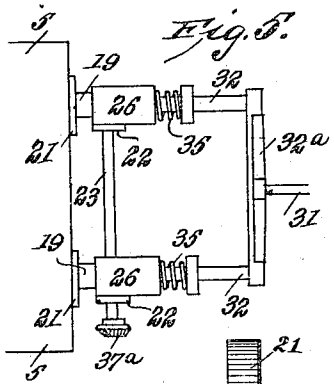
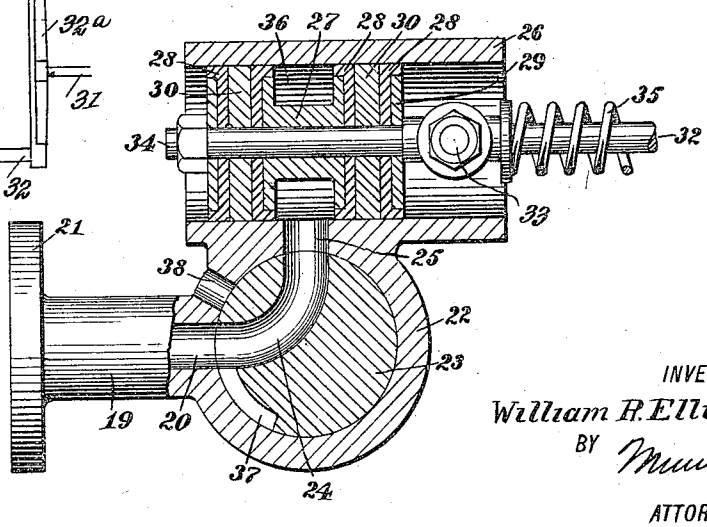


Fig. 4.



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UNITED STATES PATENT OFFICE.

WILLIAM RUSS ELLIOTT, OF SOMERSET, KENTUCKY, ASSIGNOR OF ONE-FOURTH TO BERNARD J. BOLAND, ONE-FOURTH TO WILLIAM R. ELLIOTT, ONE-FOURTH TO SAM W. HICKS, AND ONE-FOURTH TO DENNIS BROWN, ALL OF PULASKI, KENTUCKY.

BRAKE FOR ELEVATORS.

949,526. Specification of Letters Patent. Patented Feb. 15, 1910.

Application filed May 12, 1909. Serial No. 495,393.

To all whom it may concern:

Be it known that I, WILLIAM R. ELLIOTT, a citizen of the United States, and a resident of Somerset, in the county of Pulaski and State of Kentucky, have invented a new and Improved Brake for Elevators, of which the following is a full, clear, and exact description.

One embodiment of the invention is shown in the structure illustrated in the accompanying drawings, wherein like characters of reference indicate corresponding parts in all the views.

Figure 1 is a side elevation of an elevator car mounted in suitable guides and provided with a brake constructed in accordance with my invention; Fig. 2 is an enlarged detail view in longitudinal section, of the cylinders employed; Fig. 3 is an enlarged detail in plan, of the cylinders employed; and Fig. 4 is an enlarged detail of the controlling valve for the brake. Fig. 5 is a diagrammatic view in plan of the cylinders and valves connected therewith.

The objects which the present invention has in view are: to provide means whereby the action of the elevator car may be controlled in the ordinary operation; to provide means whereby the car may be automatically arrested in the event of its starting to fall; to provide means whereby a car may be held immovably in any arrested position; and to simplify the construction and arrangement of the parts constituting the brake, to increase the durability of the device, and to decrease the cost of the same.

With these objects in view, the present structure consists primarily in providing double cylinders 5, 5 of the closed end pattern such as are used in the ordinary form of internal combustion engines. Within these cylinders are slidably mounted piston heads 6 of the cylindrical head type, having guide flange extensions 7 whereby they are guided in the reciprocating action in the said cylinders 5. In the present instance they are provided with a suitable packing, that shown in the drawings consisting of a leather gasket 8, secured in position by rings 9 which are suitably secured to the head so that the leather overrides the edge of the piston head and presses tightly against the inner surface of the cylinders 5, this packing forming suitable fluid tight joints.

Within the flanges 7 is provided a crank pin 10, to which is pivotally connected a piston rod 11, which is pivotally connected to a crank pin 12 of a crank 13 mounted upon a driving shaft 14 on which is likewise rigidly mounted a pinion 15. The shaft 14 is mounted within suitable bearings in the end of a bifurcated bearing bracket 16 which is rigidly secured to the framing of the bottom of the car X.

The car X is raised and lowered within suitable guide rails 17, 17, one of which rails is provided with rack teeth 18, with which the teeth of the pinion 15 engage at all times. As the car is raised and lowered in the shaft in which it is mounted and upon the guide rails 17, 17, the pinion 15 is more or less rapidly rotated, and with it is rotated the shaft 14 carrying the cranks 13, 13. Attached to the cranks 13, 13, as stated, are the piston rods 11, 11, and the piston heads 6. The reciprocation of the piston head 6, resulting from the construction described, produces in the end of the cylinder 5 a successive rarefication and condensation of the air contained in the said cylinder. Further, unless some provision is made for the escape of the air and for the avoidance of a vacuum caused by the rapid withdrawal of the piston 6, there would be a constant lag or drag in the operation which would retard the movement of the car, if not altogether prevent its moving. If there be contained within the cylinders 5, 5, a liquid such as water, on which the said pistons were acting, the movement of the piston without some escapement in the closed end of the cylinders, would be impossible.

Upon the closed ends of the cylinders, I mount valve-carrying extensions 19, 19, in each of which is formed a channel 20. The extensions 19 are provided with bolting flanges 21, by means of which they are rigidly secured in the desired position on the end of the cylinders 5. The channel 20 leads into an enlarged chamber in a cylindrical extension 22, and within the recess formed in the extension 22, there is inserted a plug-valve 23, provided with an angular channel 24 arranged as shown in Fig. 4 of the drawings, to register with the channel 20 formed in the side of the opening in the extension 22, and with a channel 25 leading from another part thereof; the channels 25 opening

into open-ended cylinders 26. When the plug valves 23 are in position to register the two ends of the channels 24 with the channels 20 and 25, the compression chambers of the cylinders 5 are in direct communication with the interior of the cylinders 26.

The plug valves 23, 23 are fixedly mounted upon a connecting shaft 23ª. The shaft 23ª has fixedly mounted on the end thereof a miter gear 37ª, whereby the said plug valves may be manipulated to open communication between the compression chambers of the cylinders 5 and the surrounding atmosphere, as will be hereinafter set forth.

Within the cylinders 26, there are slidably mounted spool valves 27, in the ends of which are mounted any suitable form of packings 28, 28, secured between a ring 29 and a plate 30. The said spool valves, when in operative position, straddle the channels 25, as shown in the drawings, this position being assumed only when the lifting cable 31 accidentally parts. The lifting cable 31 is secured either directly or indirectly to a cross rod 32ª, the rod 32ª is connected to the rods 32, 32, which are pivotally connected at 33 with short holding rods 34, between the ends of which are secured the structural members of the spool valve 27.

The pulling strain which is exerted upon the cable 31 operates to compress the springs 35. In the expanded position of the springs 35, the heads of the spool valves are disposed at either side of the channels 25, causing a groove 36 in said valves to register with the channels 25, the heads of the spool valves preventing the exit of the fluid from the chambers formed by the grooves 36 and the walls of the valves 26, and thereby effectually blocking the exit of the fluid contained within the cylinders 5. The valve parts would remain in this relation, and the elevator car would remain in the arrested position, until the plug valves 23 are so moved that one arm of each channel 24 and the lateral groove 37 are caused to register with an opening 38 and the channel 20. In this position, the air will be passed from the channel 20 and the cylinder 5 connected therewith, through the opening 38, to the atmosphere. The extent to which the air is passed through the opening 38 is dependent upon the movement of the valve 23. It is possible to move the said plug valve so that the air expelled through the opening 38 will be reduced to the minimum.

The plug valves 23 are controlled by any suitable means, that shown in the drawings being a small beveled gear 36ª for transmitting the action from a crank 34ª through a connecting rod 35ª, which is meshed with a suitable gear 37ª with which the said plug valve is provided.

With a car constructed in this manner, and in the event of the hoisting cable parting and the car being arrested midway between the floors, the conductor, by manipulating the crank 34ª, may allow the car to drop under perfect control, it being possible for the cylinders 5 to expel just sufficient fluid or air from the cylinders to permit the car to descend at the rate of speed regulated by the expulsion at the opening 38.

By means of the construction illustrated in the drawings, wherein two cylinders 5 are mounted, the cranks being disposed in following position each to the other, a continuous retardation is exerted upon the cranks 13 by the suction on the one stroke and the compression on the other stroke, through the port 38 in each cylinder. By means of this construction, there is avoided a complicated mechanism wherein is employed a system of by-passes.

The structure thus far described may be used as an emergency safety device or for the control of the speed or the stoppage of an elevator car. This would be accomplished by using the crank handle 34ª for the purpose of turning the plug valves 23 to register with the openings 38. As stated, the amount of escapement of air through the openings 38 regulates the speed with which the piston heads 6 may travel, and thereby regulates the speed of rotation of the wheel 15. When, however, the structure is used as a safety device, the plug valve 23 is turned so that the channel 24 registers fully with the channels 20 and 25. As explained, the cable 31 draws upon the rod 32ª in such a manner that the spool valves 27 are moved toward the ends of the cylinders 26, to fully expose the channels 25 to communication with the outer air. In this position of the parts, it will be seen that the admission and expulsion of air from the cylinders 5 are unimpeded.

The car is now operated by the usual mechanism controlling the hoisting mechanism for the car. In the event of the accident, the happening of which my invention is designed to meet (such as, for instance, the parting of the rope of the hoisting cable), then the cable 31 is slackened, and the springs 35 are permitted to move the spool valves instantly, so that the ends thereof straddle the openings of the channels 35, to prevent the expulsion of air from the cylinder 5. This action is effective, blocking as it does the movement of the pistons 6—6 and thereby locking the wheel 15 in position on the track 18. This setting of the spool valves 27 is practically instantaneous on the happening of the breakage above referred to, therefore the braking or arresting influence of the device is felt on the car before the same has dropped sufficiently to have much headway.

This device as a safety device, has the further advantage above referred to, that in

the event the car is arrested in the manner just described, between floors, the operator may handle the plug valves 23, through the crank 34ª, in such manner as to gradually lower the car to the next lower floor.

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

1. A brake for elevators, comprising a gear wheel mounted on the elevator car, a rack bar mounted on the standing members of the shaft of said elevator and in toothed engagement with said wheel, a plurality of compression cylinders mounted on said car and having exit passages therefrom, a valve mechanism for controlling said passages, a plurality of pistons mounted in said cylinders and in operative engagement with said wheel, and automatic means for actuating the said valve mechanism to close the same.

2. A brake for elevators, comprising a gear wheel mounted on the elevator car, a rack bar mounted on the standing members of the elevator shaft and in toothed engagement with said wheel, a compression cylinder mounted on said car and having an exit passage, a valve mechanism for controlling said passage, a piston mounted in said cylinder and in operative engagement with said wheel, automatic means for actuating the said valve mechanism, and manually operated means for actuating the said valve mechanism.

3. A brake for elevators, comprising a gear wheel mounted on the elevator car, a rack mounted on the standing members of the elevator shaft and in toothed engagement with the said wheel, a plurality of compression cylinders mounted on said car and having exit passages, a valve mechanism for controlling the said passages, a plurality of pistons mounted in said cylinders and in operative engagement with said wheel and disposed to operate similarly and alternately, automatic means for actuating the said valve mechanism, and manually operated means for controlling the said valve mechanism.

4. A brake for elevators comprising a gear wheel mounted on the elevator car, a rack mounted on the standing members of the elevator shaft and in toothed engagement with said wheel, a plurality of compression cylinders mounted on said car and having exit passages, a plurality of pistons mounted in said cylinders in operative engagement with said wheel and disposed to operate similarly and alternately, a valve mechanism for controlling the said passages, automatic means for actuating the said valve mechanism, a valve operated passage interposed between said valve mechanism and said cylinders, a valve for controlling said passage having an extended shaft provided with a gear wheel, a crank shaft mounted within said car and provided with a gear wheel in toothed engagement with the said gear wheel on said valve, and means for rotating the said crank shaft.

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

WILLIAM RUSS ELLIOTT.

Witnesses:
JOE H. GIBSON,
T. O. LUCHURT.