No. 720,909. PATENTED FEB. 17, 1903.

W. FELDMANN.

MOUNTAIN ROPE LIFT.

APPLICATION FILED AUG. 8, 1902.

NO MODEL. 2 SHEETS—SHEET 1.

Fig. 2.

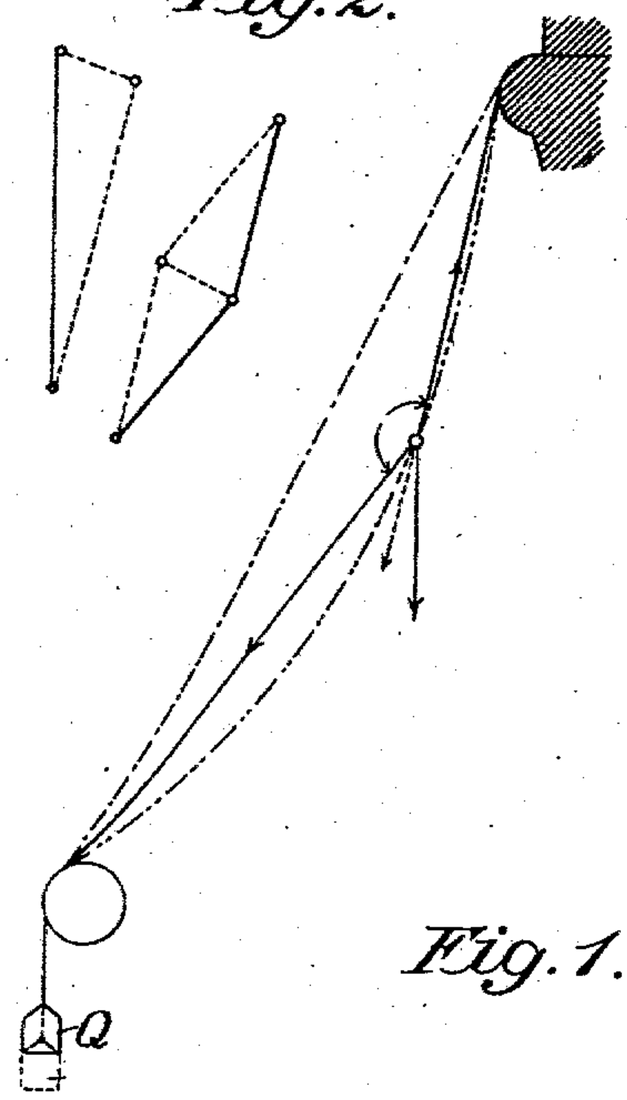
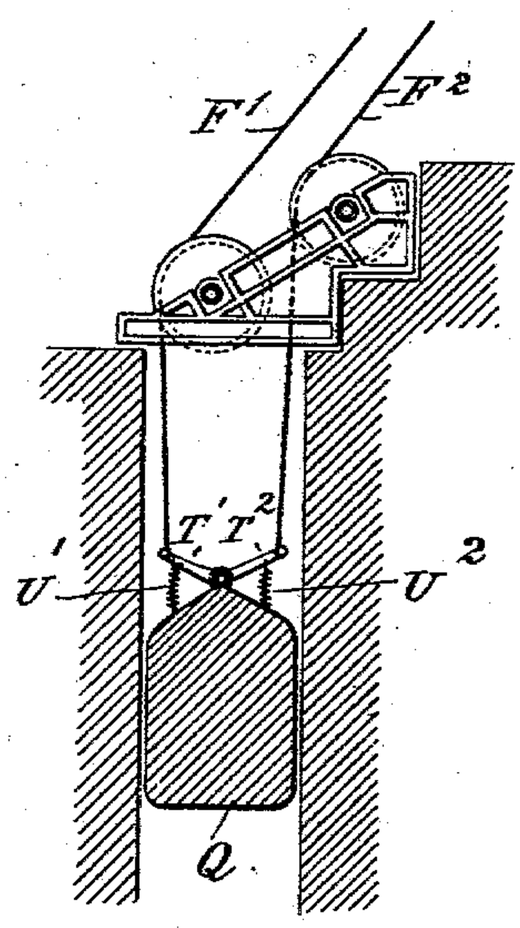


Fig. 1.

Fig. 3.



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MOUNTAIN ROPE LIFT.

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NO MODEL. 2 SHEETS—SHEET 2.

Fig. 4.

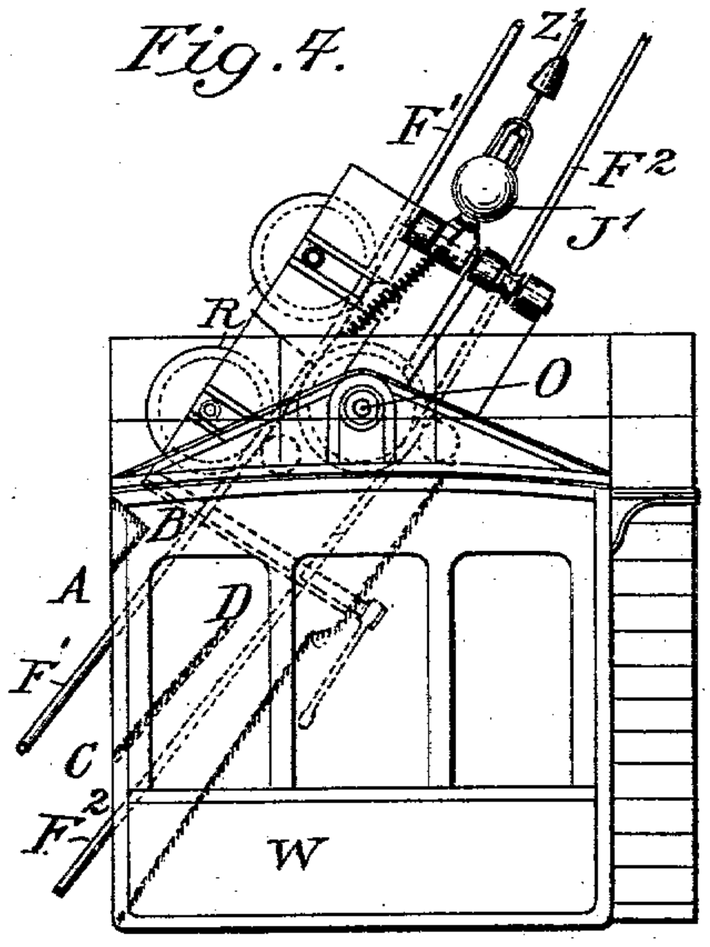


Fig. 5.

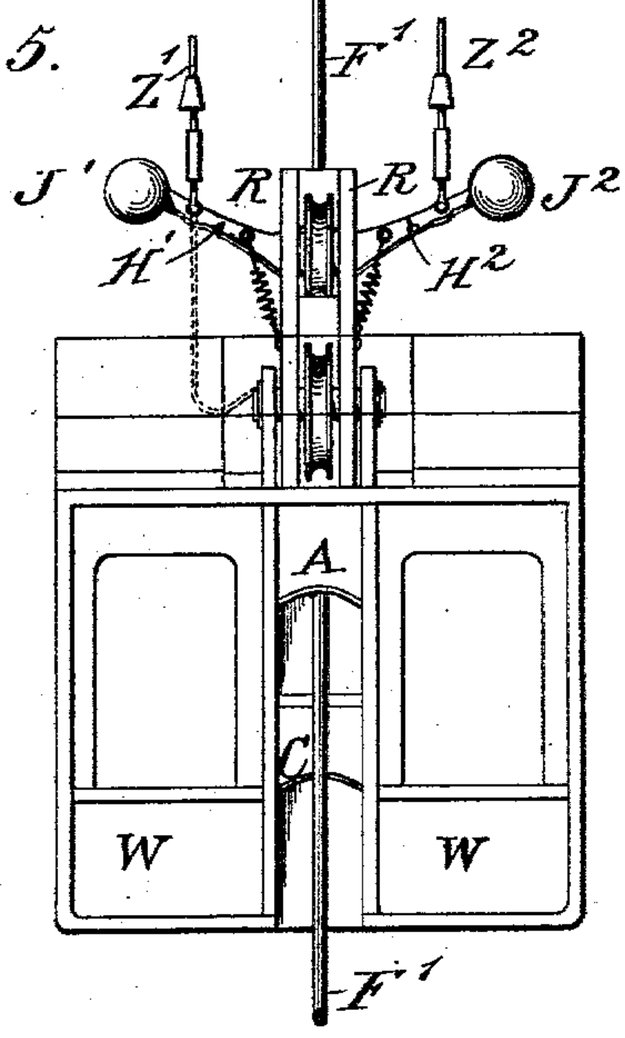


Fig. 8.

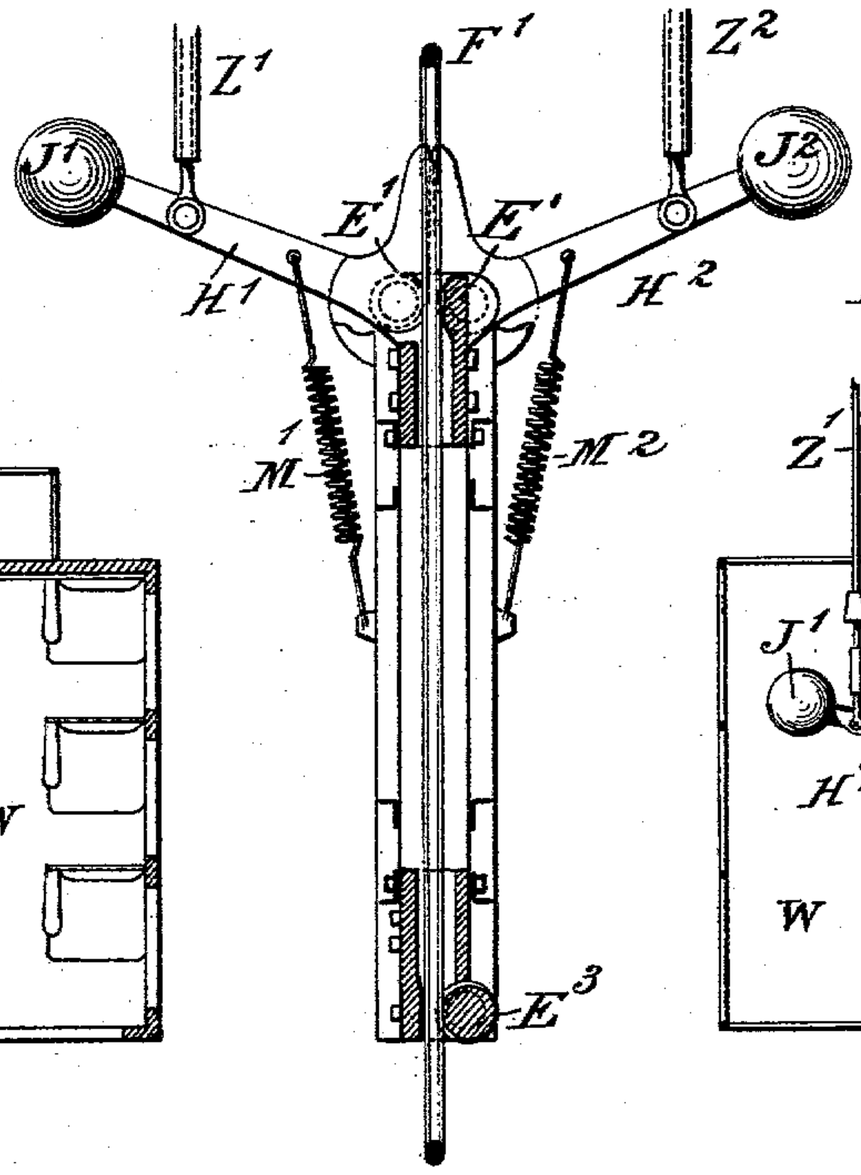


Fig. 6.

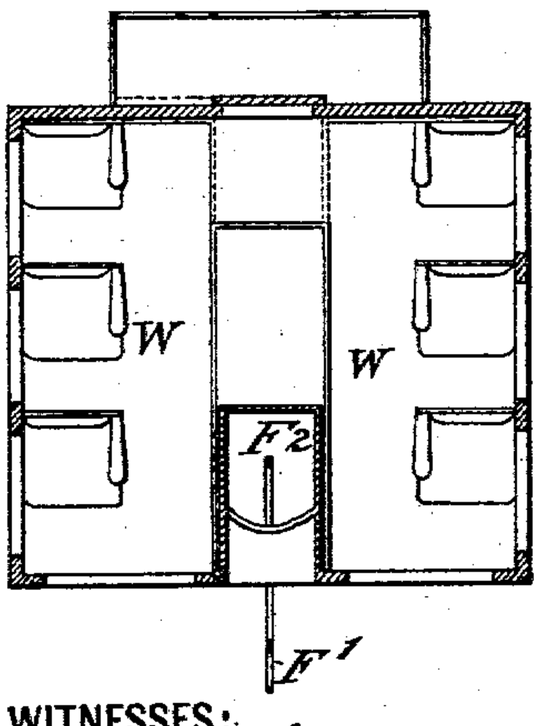


Fig. 7.

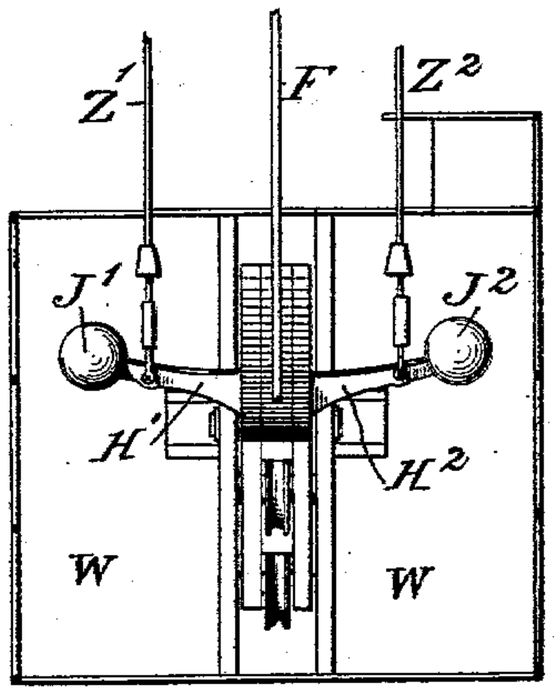
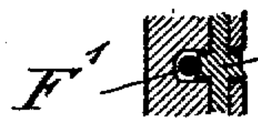


Fig. 8a



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UNITED STATES PATENT OFFICE.

WILHELM FELDMANN, OF ELBERFELD, GERMANY.

MOUNTAIN ROPE-LIFT.

SPECIFICATION forming part of Letters Patent No. 720,909, dated February 17, 1903

Application filed August 8, 1902. Serial No. 118,976. (No model.)

To all whom it may concern:

Be it known that I, WILHELM FELDMANN, a subject of the German Emperor, residing at Elberfeld, Germany, have made a new and useful Invention in Rope Lifts or Elevators, of which the following is a specification.

My invention is directed particularly to that type of rope lifts or elevators used in mountainous countries where the cars are suspended upon one or more inclined cables or ropes fixedly secured at the top and the bottom of the mountain or space it is desired to bridge; and it has for its objects, first, to provide a lift of the character indicated in which the supporting cables or ropes which carry the weight of the car shall be maintained always in a taut condition and shall guide the same in its ascent and descent in such manner as to afford the greatest safety and comfort to passengers in the movement of the car over the entire route; second, to provide such a system with a double supporting cable or rope so arranged that under normal conditions both of the cables or ropes sustain the weight of the car, and should one of them become overstrained or break the other will carry the car safely through its journey; third, to provide novel means of checking the movement of the car in the event of either of the hauling cables or ropes becoming disrupted, disconnected, or detached from the driving power at the top of the route.

My invention will be fully understood by referring to the accompanying drawings, in which—

Figure 1 is an elevational view illustrating its application in a mountain-gorge between an upper and lower station, two cars being shown and two complete systems of supporting and hauling cables or ropes, with a power-house and station at the top and a station at the lower end of the route, a short section of a continuance of one of the systems being shown also as extending from the power-house upward to a higher station. (Not shown.) Fig. 2 is a diagrammatic view illustrating the nature of the strains or forces put upon the supporting and hauling cables or ropes. Fig. 3 is a detail view of the structural apparatus at the lower station, illustrating the manner of maintaining the supporting cables or ropes always in a taut condition. Fig. 4 is a side elevational view of one of the cars and its structural arrangement, showing also the supporting cables or ropes and the hauling cables or ropes and the manner of suspending the car from the former. Fig. 5 is a rear elevational view as seen looking at Fig. 4 from left to right. Fig. 6 is a sectional view taken through the body of the car and the supporting cables or ropes. Fig. 7 is a plan view as seen looking at Fig. 5 from the top toward the bottom of the drawings. Fig. 8 is an enlarged detail view illustrating one of the supporting cables or ropes, the two hauling cables or ropes, together with the safety attachment for checking the descent of the car in the event of either of the hauling cables or ropes becoming disrupted, detached, or overstrained or of the car descending too fast by its own weight. Fig. 8^A is a sectional view taken through the lower end of Fig. 8 and illustrating the operation of one part of the hand-brake upon its corresponding cable.

Referring now to the drawings in detail, in all of which like letters of reference represent like parts wherever used, W represents the body of the car, and $F' F^2$ the supporting cables or ropes, which are secured at their upper ends in the power-house and are operatively connected at their lower ends to a mass of iron Q or other heavy weight through the agency of a strong two-armed lever $T' T^2$, the lower ends of said cables or ropes passing over sheaves, as shown in Fig. 3, and the mass Q being located in a well, so that it is capable of vertical movement. These two cables $F' F^2$ are located in a vertical plane passing through the center of gravity of the car.

U' and U^2 are strong spiral springs for varying the relative tension upon the supporting cables or ropes $F' F^2$.

In the upper portion of the car are secured three supporting-sheaves R R R, two of which are adapted to rest upon the upper supporting cable or rope F' and the lower one upon the lower cable F^2, the triangular disposition of the sheaves being such that the car will always readily adjust itself in a vertical position about its pivotal support O, as shown, no matter what may be the inclination of the supporting cables or ropes $F' F^2$, the relative strains thereof, of course, being dependent

upon the angular inclination of the supporting-cables, as is clearly indicated in the diagrammatic views shown in Fig. 2 of the drawings.

The body of the car W is provided with two diagonally-disposed channels or guideways A B C D of sufficient dimensions to permit of considerable displacement without coming into frictional contact with either of the cables.

$Z' Z^2$ represent the hauling cables or ropes, the upper ends of which are attached in the usual way to the source of power at the power-house at the power-station, the lower ends being attached directly to two angular levers $H' H^2$, pivoted in cross-heads, as shown in Fig. 4, and provided with heavy metal weights $J' J^2$ at their outer ends and attached to strong spiral springs $M' M^2$ at points near their fulcrums, the journaled or pivoted portions of said levers being provided with eccentrics or cams E' E', adapted to grip the supporting cables or ropes $F' F^2$ between them in the event of the rupture of either of said hauling cables or ropes. These several parts are secured directly to the car, as is clearly illustrated in Figs. 5 and 7, and the arrangement is such that when tension is simultaneously put upon both of the hauling-cables $Z' Z^2$ the angular levers are held in their upper position, with the strong springs $M' M^2$ under tension and the eccentrics E' E' out of mechanical contact with their respective supporting-cables $F' F^2$.

E^3 is a hand-brake connected directly to the same part of the frame which supports the levers $H' H^2$ and so arranged that the eccentrics thereof are adapted to grip both of the hauling-cables and check the car at the will of an attendant located therein, an operating hand-lever being illustrated in Fig. 4 for this purpose.

The operation of the apparatus will be obvious, it being apparent that when power is applied at the power-house to the drum or drums upon which the hauling cables or ropes $Z' Z^2$ are wound the car will ascend, and the nature of the support of the triangularly-disposed sheaves R R R upon the two supporting-cables is such that limited lateral vibration will occur, the car always ascending or descending steadily, owing to the disposition of the supporting-sheaves. At the same time the disposition of the mass Q at the lower end of the supporting-cables $F' F^2$ is such that any variation or strain put upon either of said cables will necessarily shift the levers $T' T^2$ in such manner as to equalize the strains upon the two supporting-cables. It is also apparent that should either end of the supporting-cables break the other cable will support the car to the end of its journey.

I do not limit my invention to the especial details of construction illustrated in the accompanying drawings and described in the foregoing specification, as many of the features thereof might be materially departed from and still come within the scope of my claims hereinafter, the most essential feature of my invention being directed to the manner of suspending a car upon a double or duplex supporting-cable in such manner that vibration is avoided and steadiness of movement assured and also to the novel means of maintaining the double or duplex supporting-cables always taut and in such manner as to enable the car to move with the greatest freedom and least possible vibration or oscillation.

Having thus described my invention, what I claim, and desire to secure by Letters Patent of the United States, is—

1. A rope lift or elevator provided with a double or duplex supporting-cable permanently secured at the upper station and yieldingly connected together at the lower station and to a counterweight or mass Q in such manner that they are always maintained under constant tension, substantially as described.

2. A rope lift or elevator provided with a double or duplex supporting-cable located in a plane passing through the center of gravity of the supported car, each part of said cable being adapted to independently support the car and both parts thereof permanently secured at the upper station and yieldingly connected together at the lower station and to a counterweight or mass Q and in such manner that they are always maintained under constant tension, substantially as described.

3. A rope lift or elevator embodying a double or duplex supporting-cable; a car provided with sheaves for each cable and a double or duplex hauling-cable; in combination with automatic clutching devices adapted to operate for any undue variation of tension upon either of the hauling-cables, substantially as described.

4. A rope lift or elevator embodying a double or duplex supporting-cable; a car provided with sheaves for each cable and a double or duplex hauling-cable; in combination with automatic clutching devices operatively connected with the hauling-cables, substantially as described.

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

WILHELM FELDMANN.

Witnesses:
F. A. RITTERSHAUS,
THEO. FROESCHMANN.