4 Sheets—Sheet 1.

J. J. ENDRES.

SAFETY HOISTING APPARATUS.

No. 187,836. Patented Feb. 27, 1877.

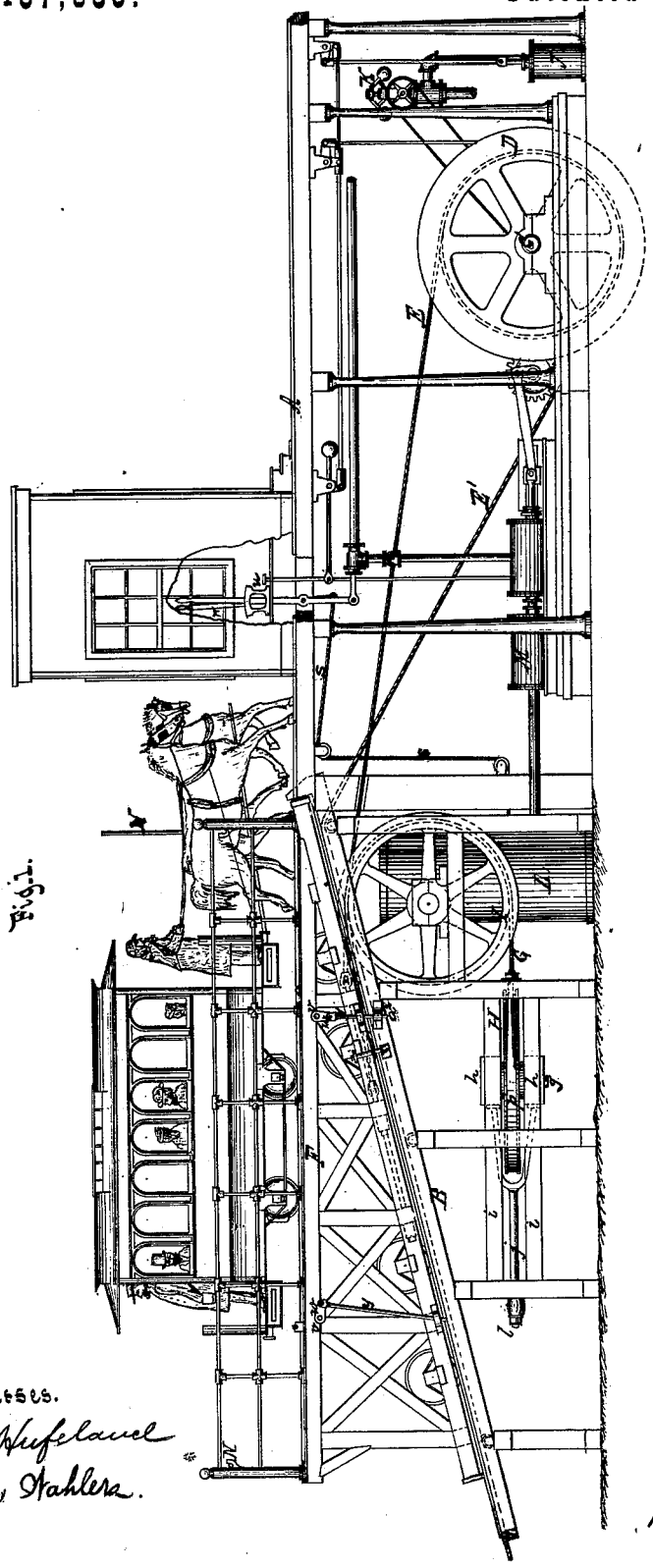

Fig. 1.

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Inventor.
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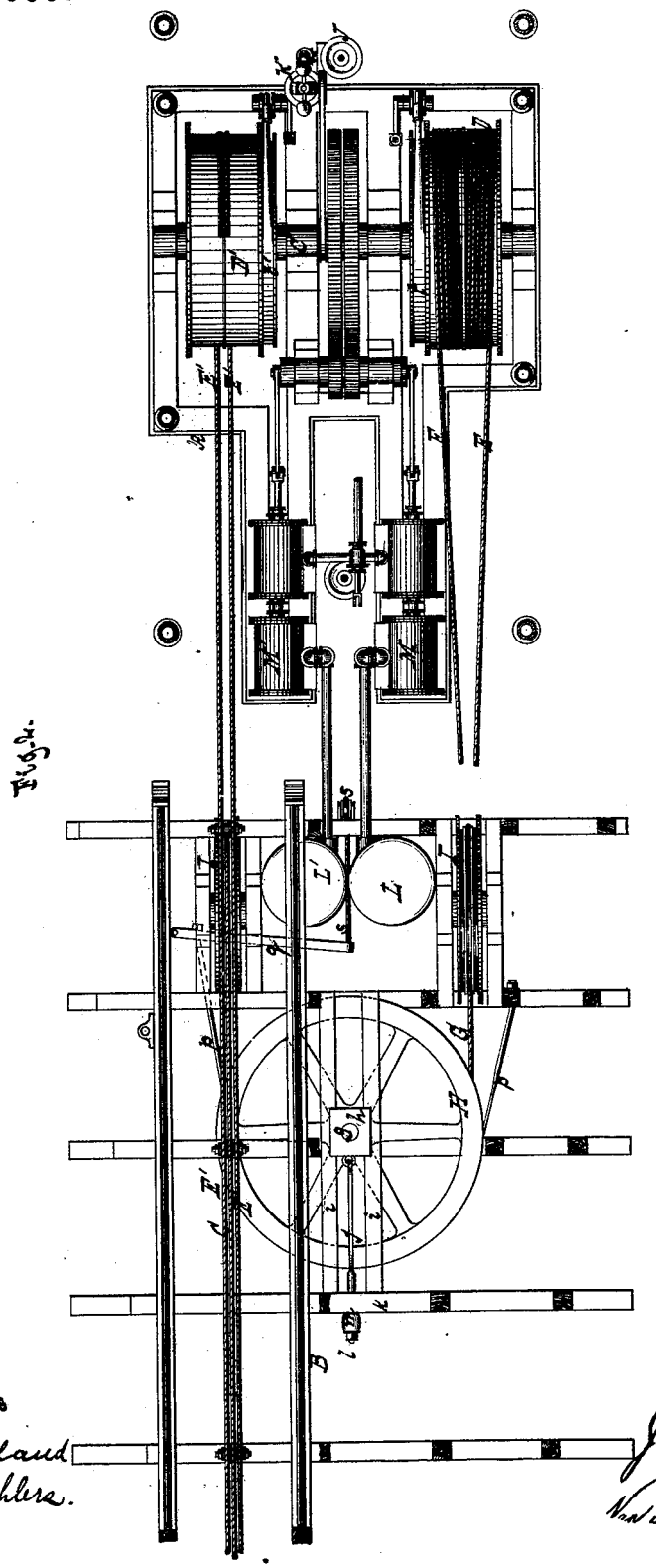

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SAFETY HOISTING APPARATUS.

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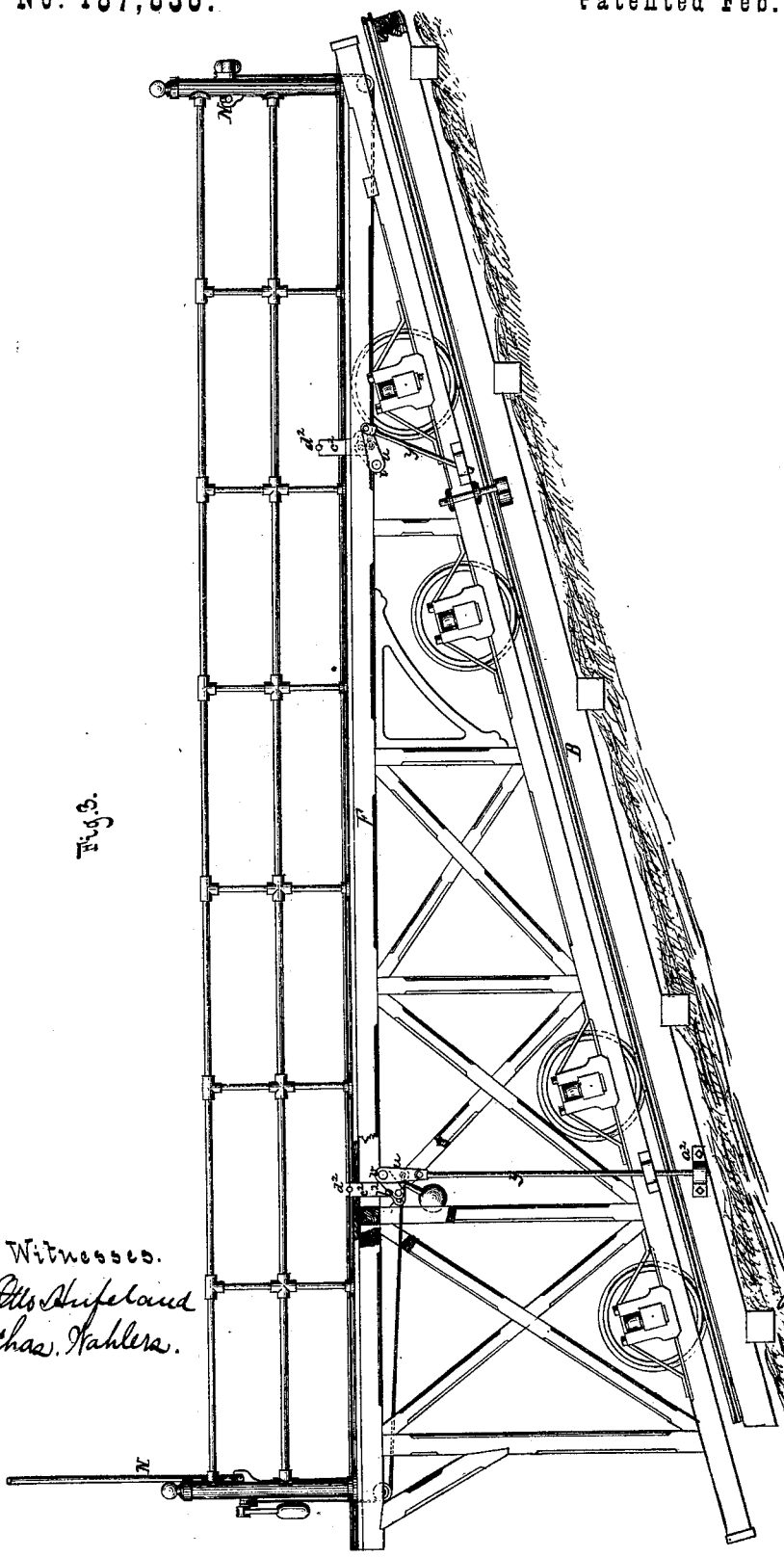

Fig. 3.

Witnesses.
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4 Sheets—Sheet 4.

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SAFETY HOISTING APPARATUS.

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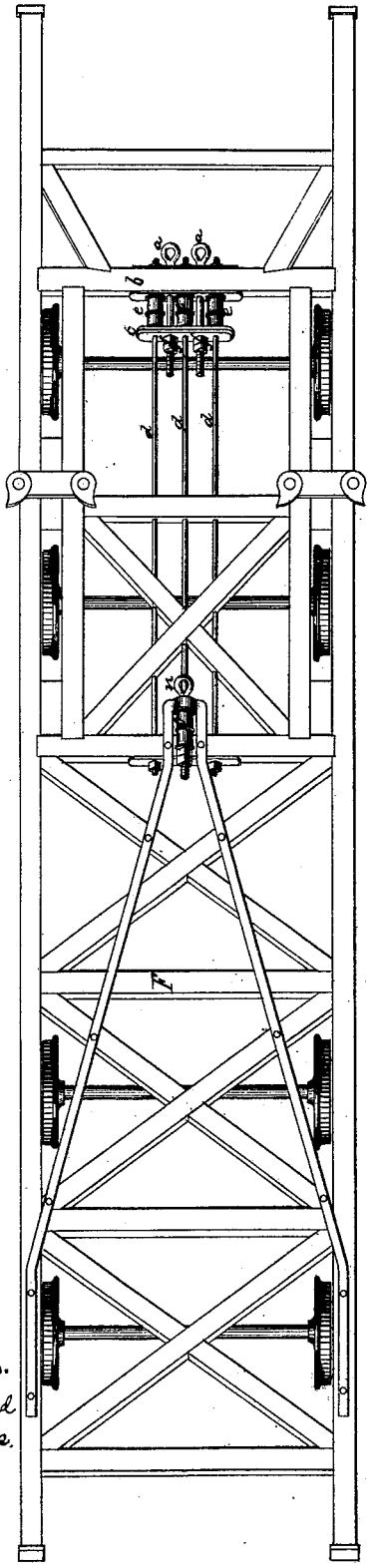

Fig. 4.

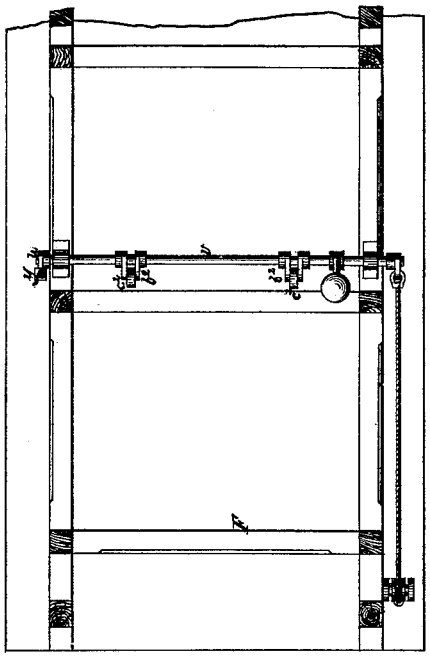

Fig. 6.

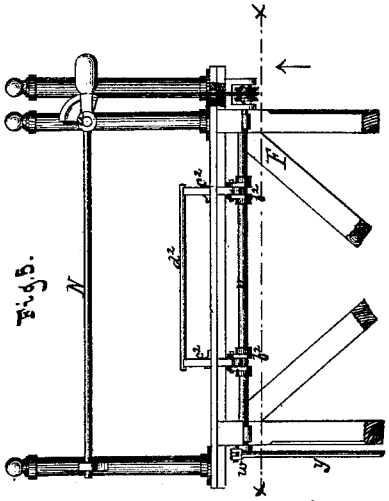

Fig. 5.

Witnesses.
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C. Ahlers.

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his attorneys.

UNITED STATES PATENT OFFICE.

JOHN J. ENDRES, OF NEW YORK, N. Y., ASSIGNOR OF ONE-THIRD HIS RIGHT TO JOHN H. BONN, OF WEEHAWKEN, N. J.

IMPROVEMENT IN SAFETY HOISTING APPARATUS.

Specification forming part of Letters Patent No. **187,836**, dated February 27, 1877; application filed January 19, 1877.

To all whom it may concern:

Be it known that I, JOHN J. ENDRES, of the city, county, and State of New York, have invented a new and useful Improvement in Safety Hoisting Apparatus, which improvement is fully set forth in the following specification, reference being had to the accompanying drawing, in which—

Figure 1 represents a side view. Fig. 2 is a plan or top view, partly in section. Fig. 3 is a side view of the inclined plane, partly in section, on a larger scale than the previous figures. Fig. 4 is an inverted plan of the cage or platform. Fig. 5 is an end view of the same. Fig. 6 is a horizontal section of the same in the plane *x x*, Fig. 5, looking in the direction of the arrow opposite to that line.

Similar letters indicate corresponding parts.

This invention relates to hoisting apparatus and elevators generally, and is particularly applicable to machinery for hoisting railroad-cars up inclined planes.

My invention consists in the combination of two hoisting-ropes with each of two trucks or cages, and with the safety-rope, which is common to both trucks, the safety-rope being connected to each truck between the two hoisting-ropes, so that the combined strain of all the ropes is in the direction of the track or well, and the trucks or cages are moved without undue friction or without danger of running off their tracks. The two hoisting-ropes of each truck or cage wind on a common drum from the center outward, so that the strain can be equally divided on both hoisting-ropes during the entire motion of the truck or cage.

The trucks are provided with gates, which act on latches, so that the trucks cannot be moved before the gates are closed. With the gates of the truck are also combined stops, which are raised above the level of the platforms of said trucks whenever the gates are closed, and which prevent the load from sliding or rolling on said platforms.

In the example shown by the drawings, the letter A designates an engine-house, which is situated at the top of the incline B, and which contains the hoisting apparatus. The incline B is provided with two tracks, one for the ascending and the other for the descending truck. The hoisting apparatus consists of a double-cylinder engine, which imparts motion to the shaft C that carries two drums, D D′, from each of which extend two ropes, E E E′ E′, to the trucks F. The inner ends of these ropes are secured to the drums on opposite sides of their centers, and at equal distances from said centers, (see Fig. 2,) and their outer ends are fastened to eyebolts *a a*, Fig. 4, which extend through a cross-beam, *b*, of the truck, and through a traverse, *c*, which slides on rods *d*, and is depressed against elastic cushions *e* by means of nuts *f* fitted to the eyebolts *a*. These eyebolts are situated at equal distances from the middle of the truck, and as the ropes E E or E′ E′ wind up uniformly from the middle of the drums outward, the lateral strain produced by one of said ropes on the truck is counteracted by that of the other rope, and the truck has no tendency of being crowded against the sides of the rails or of being thrown off the track.

If a single hoisting-rope is used for each truck a lateral strain cannot be avoided during certain portions of the motion of the truck; and, furthermore, by using two hoisting-ropes for each truck, additional security is provided, and the safety-rope can be connected to the middle of both trucks, as will be presently explained.

G is the safety-rope which extends round a pulley, H, which is situated beneath the tracks of the incline B, and is mounted on a vertical arbor, *g*, which has its bearings in boxes *h* that slide between guides *i i*, Figs. 1 and 2, and are connected to a rod, *j*, which extends through a stationary beam, *k*, and is provided at its end with a nut, *l*, that bears on an elastic cushion, *m*. By turning this nut the strain of the safety-rope can be adjusted while the bearings of the arbor *g* of the pulley H are yielding, to prevent sudden jars in case the safety-rope comes into action. From the pulley H the two ends of the safety-rope are carried through under guide-pulleys I, and over these pulleys to eyebolts *n*, (see Fig. 4,) which are secured one to each of the trucks

F, and which are situated under the bottoms of said trucks, exactly in their middle.

The guide-pulleys I are provided with three grooves, one in the middle for the safety-rope and two at the sides at equal distances from the middle for the hoisting-ropes. The eyebolts *n* are provided with elastic cushions *o*.

When the hoisting apparatus is in operation the safety-rope follows the motions of the trucks without supporting any portion of their weight; but if the hoisting-ropes of one or both trucks should give way, the safety-rope is immediately brought into action, and, since this rope is connected to the middle of the trucks, it produces no lateral strain, and, consequently, it has no tendency to throw these trucks off their tracks.

With the pulley H and with the safety-rope is combined a brake, *p*, which consists of a strap that extends about half-way round said pulley, and one end of which is firmly secured to the frame-work of the incline B, while its other end is connected to a lever, *q*, Fig. 2, which is operated from the engineer's stand by means of a hand-lever, *r*, (see Fig. 1,) the levers *q* and *r* being connected by a rope, *s*. Instead of using a hand-lever for operating the brake *p*, a steam-cylinder may be used for this purpose.

With the drums D D′ are also combined brakes *t t′*, Fig. 2, which connect with a foot-lever, *u*, Fig. 1, extending up through the engineer's stand, so that the engineer, by stepping on said foot-lever, can apply the brakes *t t′* with more or less force, as he may desire. With these brakes *t t′* I have also combined a steam-cylinder, J, and a ball-governor, K, to which motion is imparted from the shaft C of the drums D D′. When the balls of the governor K are down the steam-valve of the cylinder J is closed; but if the speed of the hoisting-shaft C increases beyond the desired limit, the balls of the governor fly out, the steam-valve is opened, and, by the action of the steam on the piston in the cylinder J, the brakes are applied.

By this arrangement the engineer is prevented from running the trucks at an unsafe speed, since the brakes are applied automatically by the governor K whenever the speed of the trucks exceeds the desired limit.

As the trucks pass each other in the middle of the incline the weight of the ropes attached to the descending truck overbalances the weight of the ropes attached to the ascending truck. In order to counteract this overbalance two air-vessels, L L′, and two pump-cylinders, M M′, are combined with the steam-cylinders of the hoisting-engines, so that the air from one air-vessel can be pumped into and compressed in the other, and the compressed air can be made to assist the engine, which, at the time being, has to overcome the greatest resistance.

This combination, however, forms the subject-matter of a different application for a patent, and I do not, therefore, give a detailed description thereof in this specification.

The trucks F are constructed to be used for elevating railroad-cars or other vehicles, and they are provided at their ends with gates N, Figs. 3 and 5, which swing on pivots *u*, and are connected by ropes, chains, or other equivalent means, each with a rock-shaft, *v*, extending across the truck beneath its platform, as shown in Figs. 5 and 6. On one end of this rock-shaft is secured an arm, *w*, which connects with a bolt or latch, *y*, Fig. 3.

When the truck has arrived at one terminus of the incline, and the proper gate is opened to allow the vehicles to pass off, the bolt *y* connected to said gate is depressed, and caused to engage with an eye, a^2, secured to the side of the track, so that the truck cannot be moved before said bolt is withdrawn from this eye.

When the truck is ready to start, the gate is closed, and by doing this the bolt *y* is raised clear of the eye a^2.

On each of the rock-shafts *v*, beneath the platform of the truck, are mounted arms b^2, which carry slides c^2, that extend up through the platform of the truck, and are connected by cross-bars d^2. When the gates are closed these cross-bars are raised to the position shown in Fig. 5, so that they form stops, which prevent the vehicles on the trucks from rolling and from moving off before the gates are opened. By these means accidents are prevented which arise if the truck is started before a vehicle has passed completely off from the same.

It will be readily seen that the improvements described in the foregoing specification are applicable to elevators with cages moving up and down in vertical wells, as well as to such elevators in which trucks are used, which move up and down on inclines.

What I claim as new, and desire to secure by Letters Patent, is—

1. The combination, with two hoisting-ropes, E E′, extending from drums D D′, and attached to the trucks F of an elevater, of a safety-rope, G, passing around the horizontally-journaled pulley H, and connected at its ends with the middle of the trucks, substantially as described.

2. In combination with the drum D, the truck F and the track B of two ropes, E E′, secured at one end of the truck, and at the other end to the center of the drum, so as to wind outwardly on the drum from its center, substantially as described.

3. The horizontally-adjustable pulley H, in combination with the pulleys I, the safety-rope G passing around the pulleys H and I, and connected at their ends with the trucks F, and the two hoisting-ropes, E E′, connected with the truck, and the drums D D′, substantially as described.

4. The combination of bolts or latches *y* with gates N of a truck or cage, F, for retaining the trucks or cages while the gates are opened, substantially as described.

5. The combination of stops *d* with the gates N of a truck or cage, substantially as and for the purpose set forth.

In testimony that I claim the foregoing I have hereunto set my hand and seal this 10th day of January, 1877.

JOHN J. ENDRES. [L. S.]

Witnesses:

W. HAUFF,

E. F. KASTENHUBER.