

No. 32,732.

Patented July 2, 1861.



*Fig. 2*

Inventor  
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# UNITED STATES PATENT OFFICE.

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## COAL-RAILROAD.

Specification of Letters Patent No. 32,732, dated July 2, 1861.

*To all whom it may concern:*

Be it known that we, WILLIAM YODAN and DANIEL THOMAS, of West Elizabeth, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in the Mode of Constructing and Operating Coal-Railroads; and we do hereby declare the following to be a full, clear, and exact description thereof, reference being had to the annexed drawings, forming part of this specification, in which—

Figure 1 is a side elevation of a coal rail road constructed on our improved plan. Fig. 2 is a plan or top view of the same. Figs. 3, 4 and 5 are representations of the clasp employed to attach the cars to the endless rope by means of which the loaded cars are lowered, and the empty cars raised, from and to the mouth of the coal pit.

In the several figures, like letters of reference denote similar parts.

The ordinary mode of operating coal rail roads where the mouth of the pit is elevated considerably above the level at which the coal is desired to be delivered, is to construct two parallel tracks having as nearly as possible a uniform grade throughout, excepting near the termini, where the tracks are made level or nearly so, so as to bring the cars to rest at those points. A rope is used which is a little longer than one of the tracks, and is passed around a pulley or wheel at the top of the grade. To the extremities of this rope, the cars are attached, either a single car or a train of cars, as may be desired, the loaded cars at the top of the grade being attached to one end of the rope and the empty cars at the bottom of the grade to the other end of the rope, so that, as the loaded cars descend by their own weight, they may draw up the empty cars at the pit's mouth. This plan which has heretofore been generally adopted, answers very well, where the road is comparatively short and admits of a steep and uniform grade, so that there is fall enough to give the requisite power throughout the entire length of the road, for otherwise the loaded cars would not have power to reach the end of the track, or raise the empty cars to the required level. But where a very long road is required, so that the height from the lower level to the pit's mouth, if distributed throughout its length, gives too light a grade to furnish sufficient power to work

the cars, it becomes necessary to devise some plan for accomplishing this object. If the steep grade of the road be made at one point and the remainder be made level or nearly so, the present mode of operating the cars would not answer, as the loaded cars would be on the level just when the empty cars reached the foot of the grade, and needed power to raise them up; and vice versa, the loaded cars would be descending the grade, and exercising their fullest power, just when the empty cars are on the level, and need very little power to operate them. This plan might answer partially on a short road, as the momentum of the cars passing down a steep grade would continue for a short time after they reached the level, but on a long road, this plan would not answer. Our invention is designed to supply this need, which is being more and more felt, as the coal near the rivers is being worked out, and mines have to be opened at a greater distance from the river, at which the coal is to be delivered.

In the drawing, the level portion of the road is made short in proportion to the length of the inclined portion owing to the inconvenience of increasing the length of the drawing.

In Figs. 1 and 2 *a. a.*, *b b* are two rail road tracks, placed parallel to each other, and as near together as is convenient. The higher end is supposed to be at the level of the pit's mouth, and the lower end at the level of the river or road at which the coal is to be discharged. At the upper terminus it is level for a short distance, so that the empty cars, when they reach the summit, will not be in danger of running backward. From the summit downward the road has a very steep grade for a short distance, which, toward the bottom, gradually diminishes until the road becomes nearly level for the rest of the distance, having only a slight descending grade. The steepness of the grade, and the length of the lower and nearly level portion of the road is of course regulated by the contour of the ground, and the circumstances of the locality, the object being, especially where the road is long and the elevation not proportionally great, to have as steep a grade, as is consistent with safety near to the pit, and making the rest of the road, with but a slight descent.

On the summit level, under and between the rail road tracks, is a horizontal drum *d*



around which is passed the endless rope *c* which extends along the center of both of the tracks, *a* and *b* and passes around another drum *e* on the lower level, near the terminus, of the road. The upper drum *d* revolves on its axis in fixed bearings, but the lower drum *e* revolves in bearings attached to a sliding carriage *f*, which is drawn downward so as to keep the rope tight by a weight *g* passing over a pulley *h*, and descending into a pit (see Fig. 1). Lest the rope should slip around the drums *d* and *e* it is also carried around a wheel *i* near the drum *d* on the summit level, so that, as it passes around, it will cause both the drum *d* and the wheel *i* to revolve on their axes, and thus the speed of the motion of the rope may be regulated. This is effected by two brake beams *k*, *k* which press on the circumference of the drum *d* on either side of its center, when the lever *l* is pressed outward. By this means the motion of the rope *c* and the descent of the cars attached thereto may be stopped or retarded at pleasure. To steady the motion of the cars on their descent, we use a fan *m* which may be sunk in a pit under the road. This fan *m* is attached to a shaft *n* on which is a loose pinion *o* which gears into teeth on the periphery of the wheel *i* around which the rope *c* is passed. The pinion *o* gears with a clutch *q* to the fan shaft so that by means of a rod *r* the fan may be at pleasure connected with or separated from the wheel *i*, when connected, the motion of the wheel *i* causes the rapid rotation of the fan, which will serve to regulate the descent of the cars preventing too rapid a motion.

The endless rope *c* passes over pulleys *s*, *s* placed in the center of the tracks *a* and *b* and under pulleys *s'*, *s'* at the upper and lower levels where the cars are to stop. The cars are attached to the endless rope *c* by means of a clasp which we have contrived for the purpose of securely fastening the cars, and yet allowing them to be rapidly detached or attached at pleasure. This clasp consists of two strips of iron *t*, *t* hinged together at one end (see Fig. 3) and each having a semi-circular groove *u* down its inner face so that when closed the grooves unite to form a tubular opening of somewhat smaller diameter than the endless rope. In order to give the clasp a better hold on the rope *c* the grooves *u*, *u* are roughened or are furnished with ribs or projections which bite the rope, when the clasp is closed by the slide *v* Fig. 4, which is passed over the strip *t*, *t* from the hinged end. The clasp *t*, *t* is rather smaller at its hinged end than at the other end, so as to act as a wedge inside of the slide *v*. A chain is attached to the projecting tongue of the slide *v* and the cars are hooked on to this chain. The mode of attaching the cars to the rope is to pass the rope in the grooves, between the strips *t*, *t*

with the hinged end farthest from the car, the slide is then passed over the clasp *t*, *t* at the hinged end, and the car is hooked to the slide, the weight of the car pulling on the slide draws it down over the clasp causing it to grip the rope so tight as to prevent its slipping. Fig. 5 shows the clasp attached to the rope *c*. The rope is not kept down to the track otherwise than by its own weight which is sufficient to keep it resting on the pulleys or rollers *s*, *s* excepting near to the car where the rope is lifted by the strain, thus keeping the clasp off the ground, and preventing its becoming entangled with the timbers of the road.

At either end of the track, there is a switch as usual, so that the cars having descended the road, full on one track, may when emptied be switched off on to the other track, to ascend to the pit's mouth.

The mode of operating the road as thus constructed is as follows: One or more loaded cars at the summit level are attached to the rope each by a separate clasp, and if there are any cars at the lower end of the road, they are also attached to the rope, on the other track. The loaded cars are then started down the track, and run down the steep grade, carrying forward any loaded cars, which may be yet on the more level part of the descending track, and carrying up the empty cars. When the loaded cars have reached the bottom of the steep grade, they will run some distance farther by the momentum received on their descent, but would not on a long road carry the cars to the end of the track, especially as the ascending empty cars do not reach the foot of the grade until the force of the descending full cars would be spent. But before the first full cars have reached the bottom of the grade, there will probably be more cars ready to descend and they are attached after first slacking the speed of the train by the brake; and as the cars are being continually attached to the rope, a continual force is in operation to keep the train moving, so that the cars will be descending on one side, and ascending on the other, all the time. And herein is one of the great advantages of our mode of working coal roads, where the road is a long one, for by the old plan, no fresh cars can be attached to the rope until those sent down have reached their destination, but by our plan, it is no matter how long the road is, the cars can be continually attached and detached at pleasure, and no delay is caused. The effect of having a number of loaded cars on the rope at the same time on the steep grade, and others on the more level portion of the track is that the motion of the train is much more steady and uniform, and does not shake the road so much, so that the road as well as the cars will last much longer.



We are aware that coal rail-roads have been constructed and used with inclined planes of steep grade throughout and having ropes extending over such grade, to one  
5 extremity of which ropes, are attached the loaded cars and to the other empty cars, the latter being drawn up the grade by the descent of the former, but this we do not claim. But

10 What we do claim as our invention and desire to secure by Letters Patent is—

1. So constructing the inclined plane of coal rail roads as that the grade at one end near the coal pits, shall be very steep, while  
15 the grade of the remaining portion of the road is but slightly inclined, and continuing the rope to which the cars are attached over both the steep and the more level portions of the road, for the purpose of gaining power,

by the descent of loaded cars on the steep 20 grade to carry forward other loaded cars down that portion of the road which is not sufficiently inclined to cause them to descend by their own unaided gravity, as well as to draw up the empty cars on the other track, 25 substantially as hereinbefore described.

2. The use of a clasp constructed as described, of the hinged strips *t*, *t*, and slide *v* for the purpose of attaching the cars to the  
endless rope. 30

In testimony whereof we, the said WILLIAM YUDAN and DANIEL THOMAS, have hereunto set our hands.

WM. YUDAN.  
DANIEL THOMAS.

Witnesses:

DAVID LYNCH,  
WM. PATTERSON.