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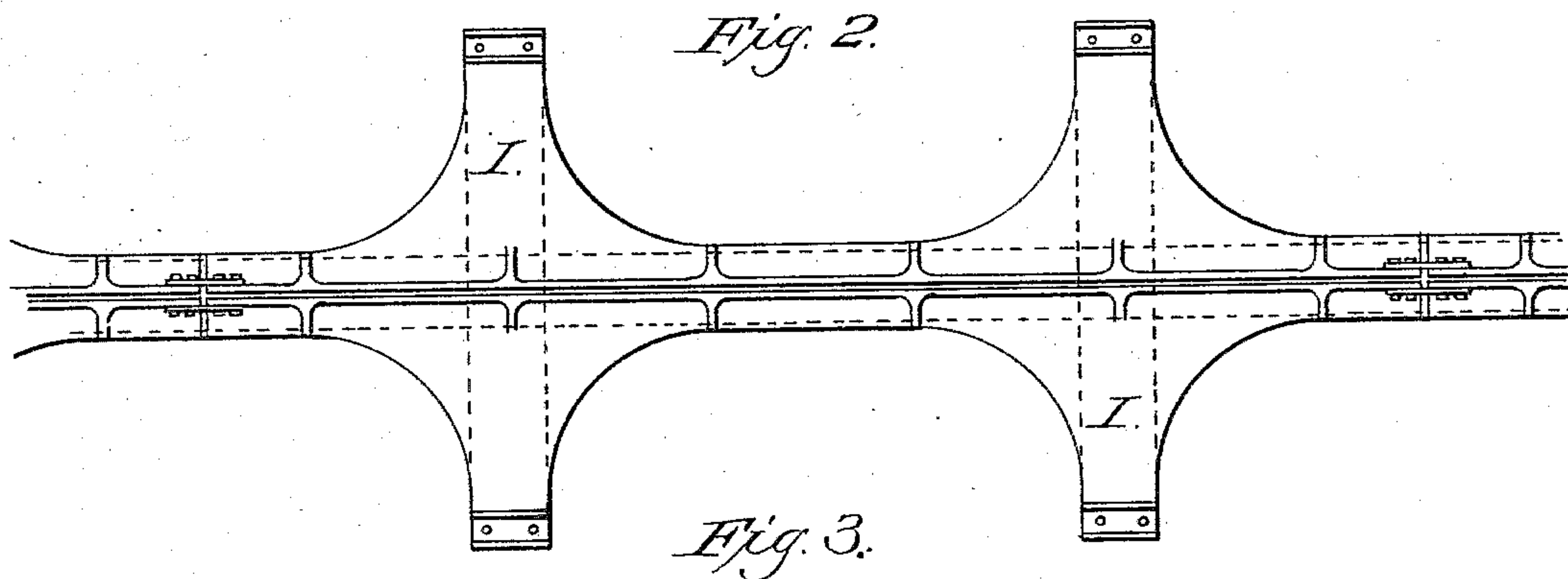
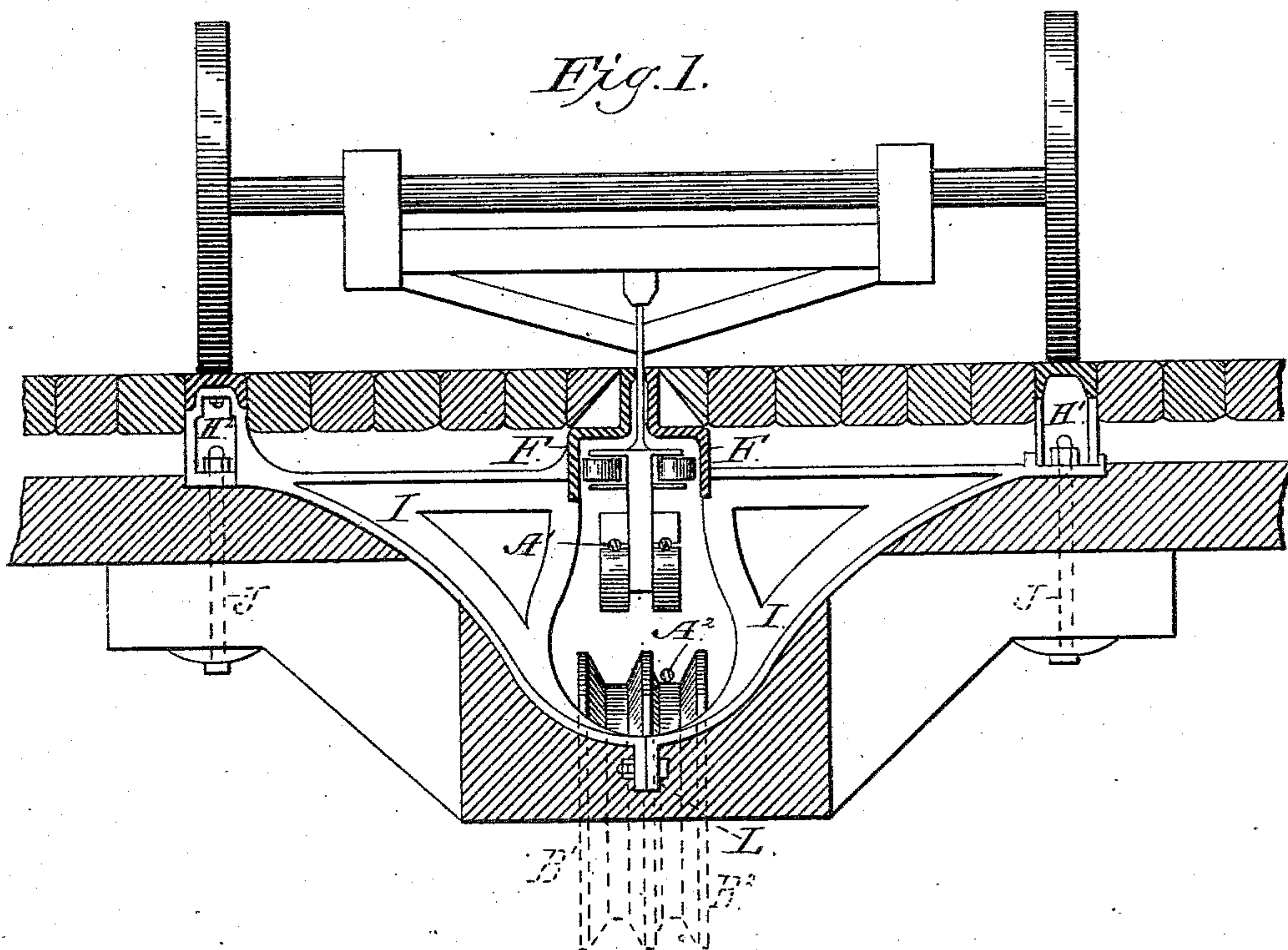
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C. F. FINDLAY & D. J. MILLER.

TRACTION ROPE RAILWAY.

No. 281,256.

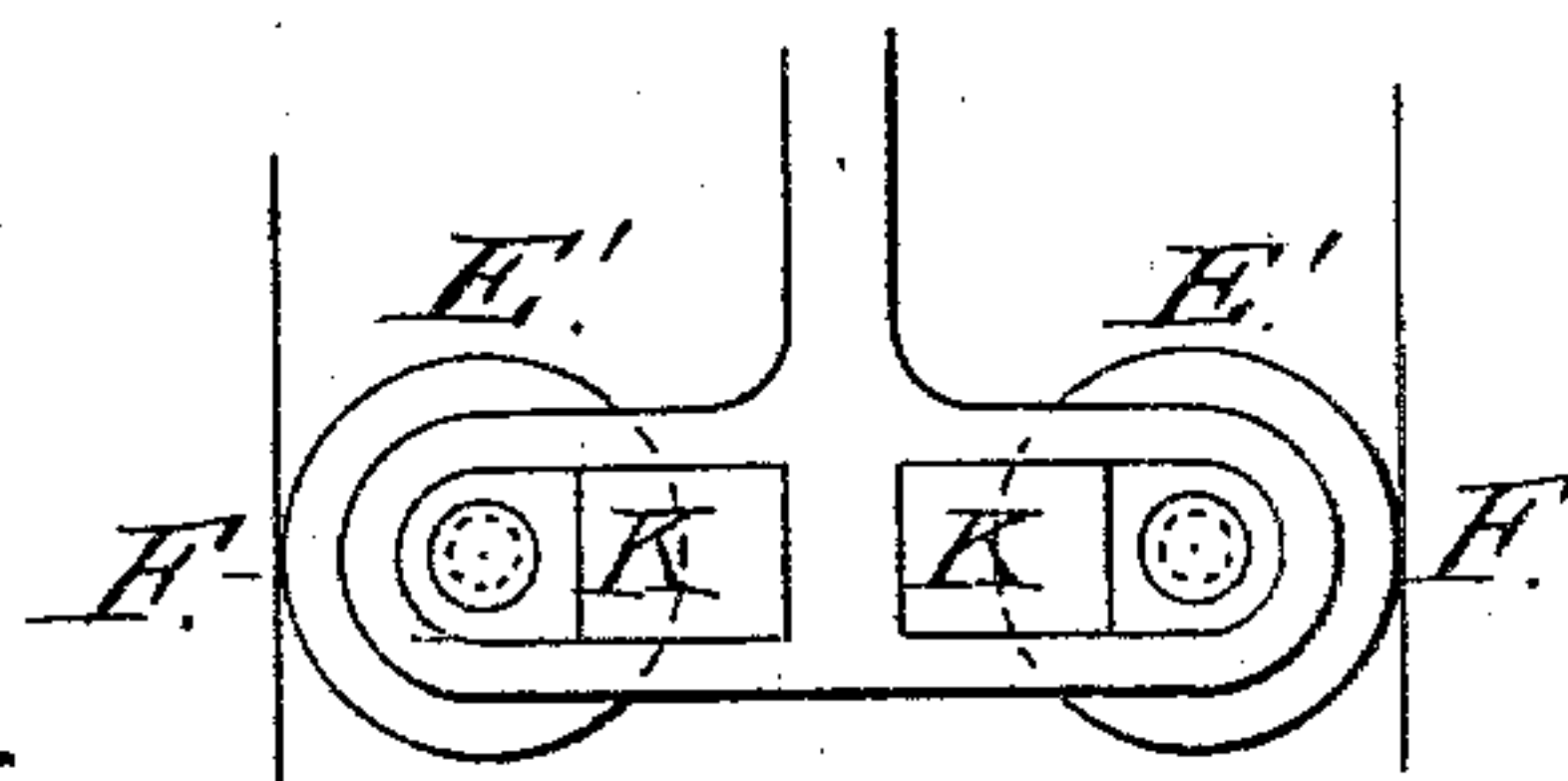
Patented July 17, 1883.



Witnesses:

O. Lundquist

R. M. Johnson.



Inventors:

C. F. Findlay }
D. J. Miller } D. J. Miller

(No Model.)

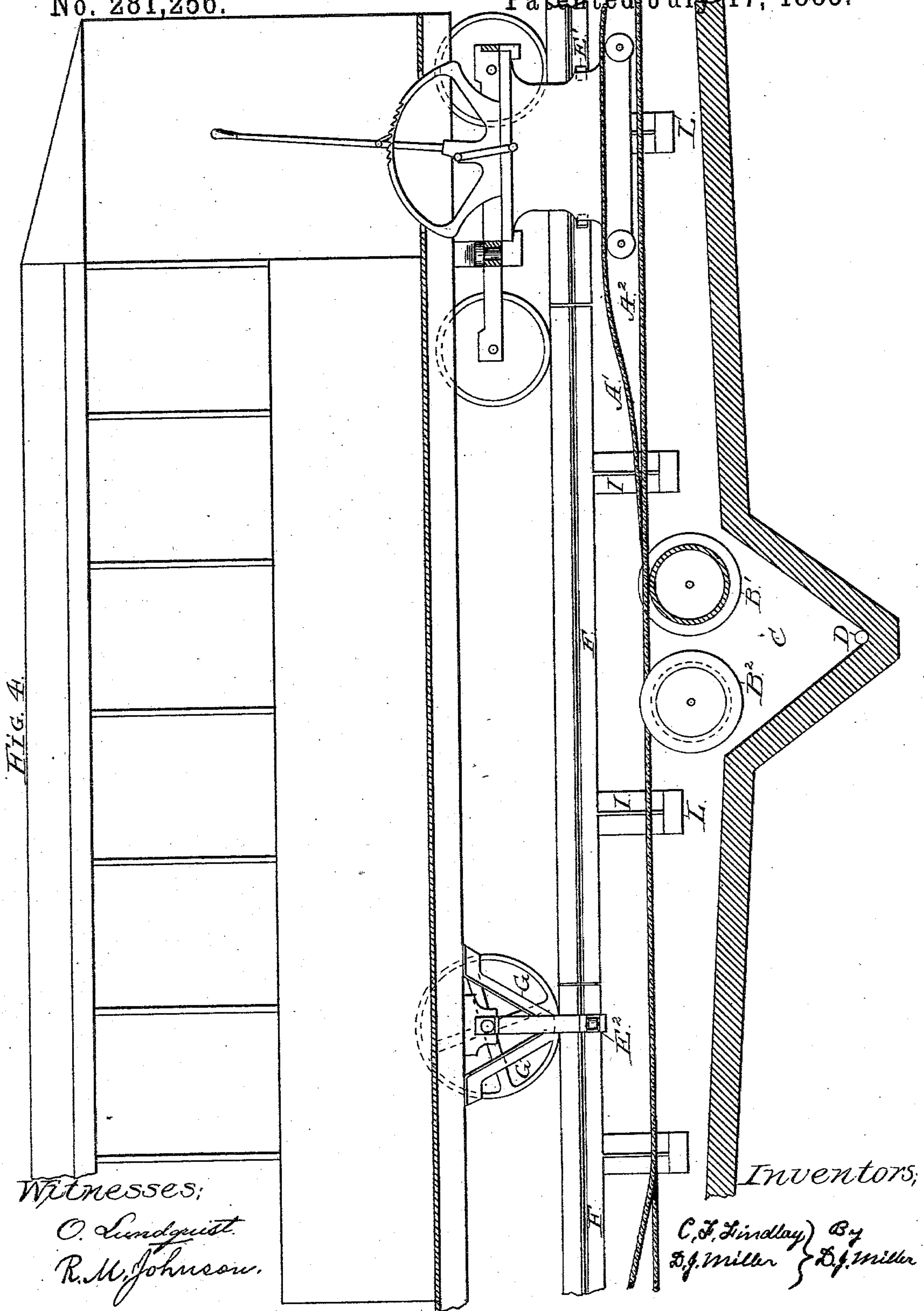
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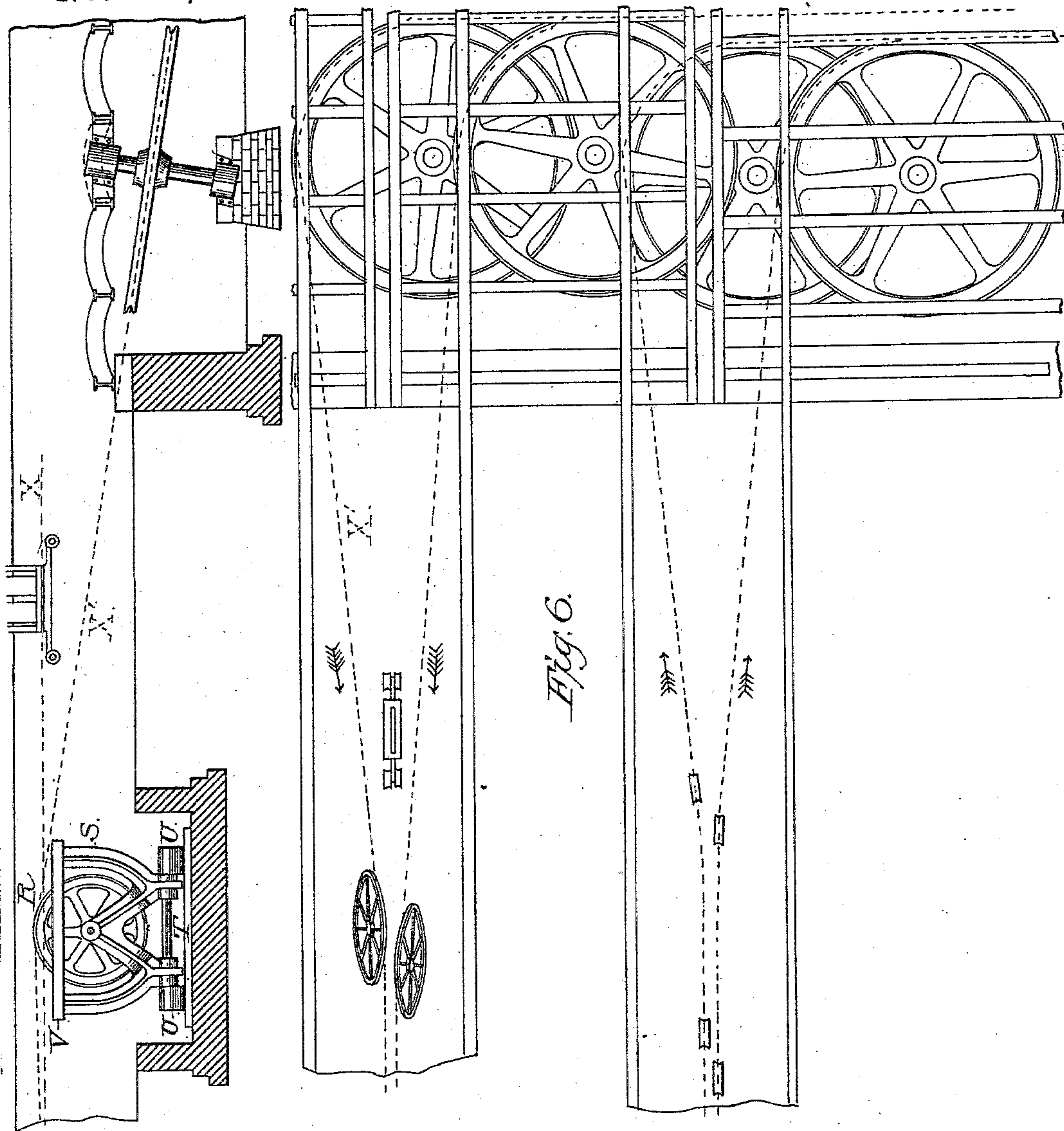


Fig. 5.

Fig. 6.

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Fig. 7.

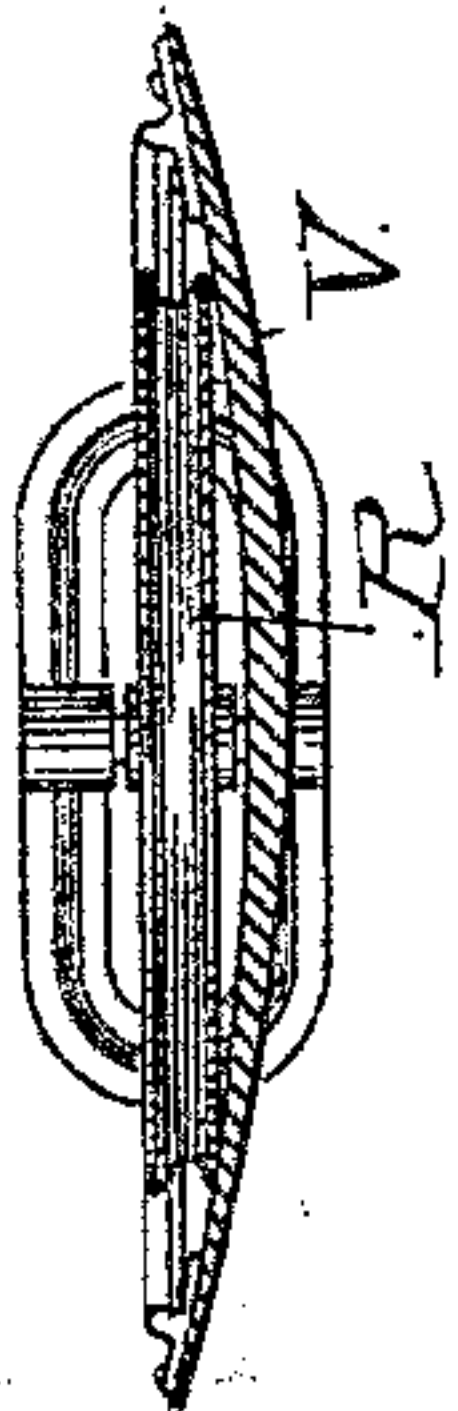
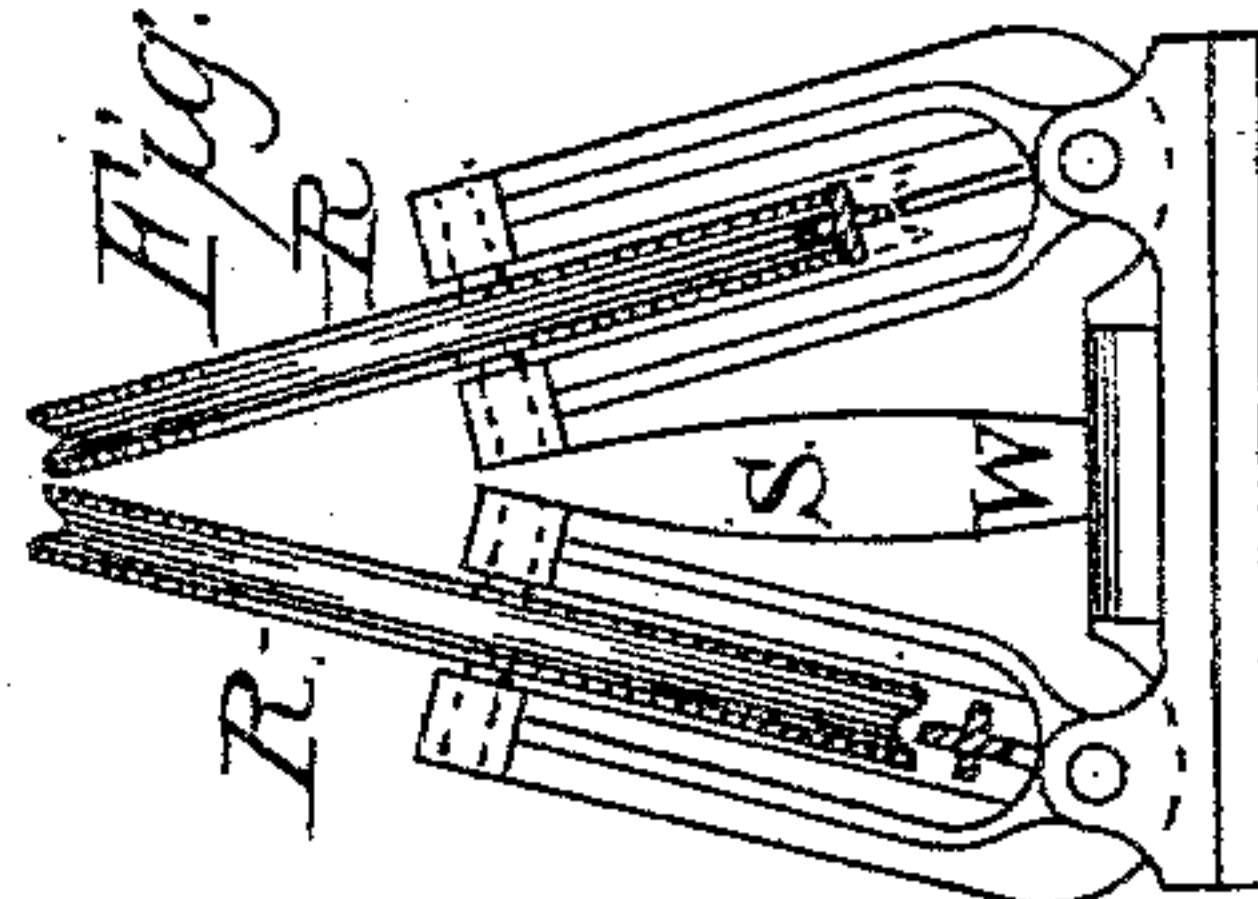


Fig. 8.



Inventor.

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(No Model.)

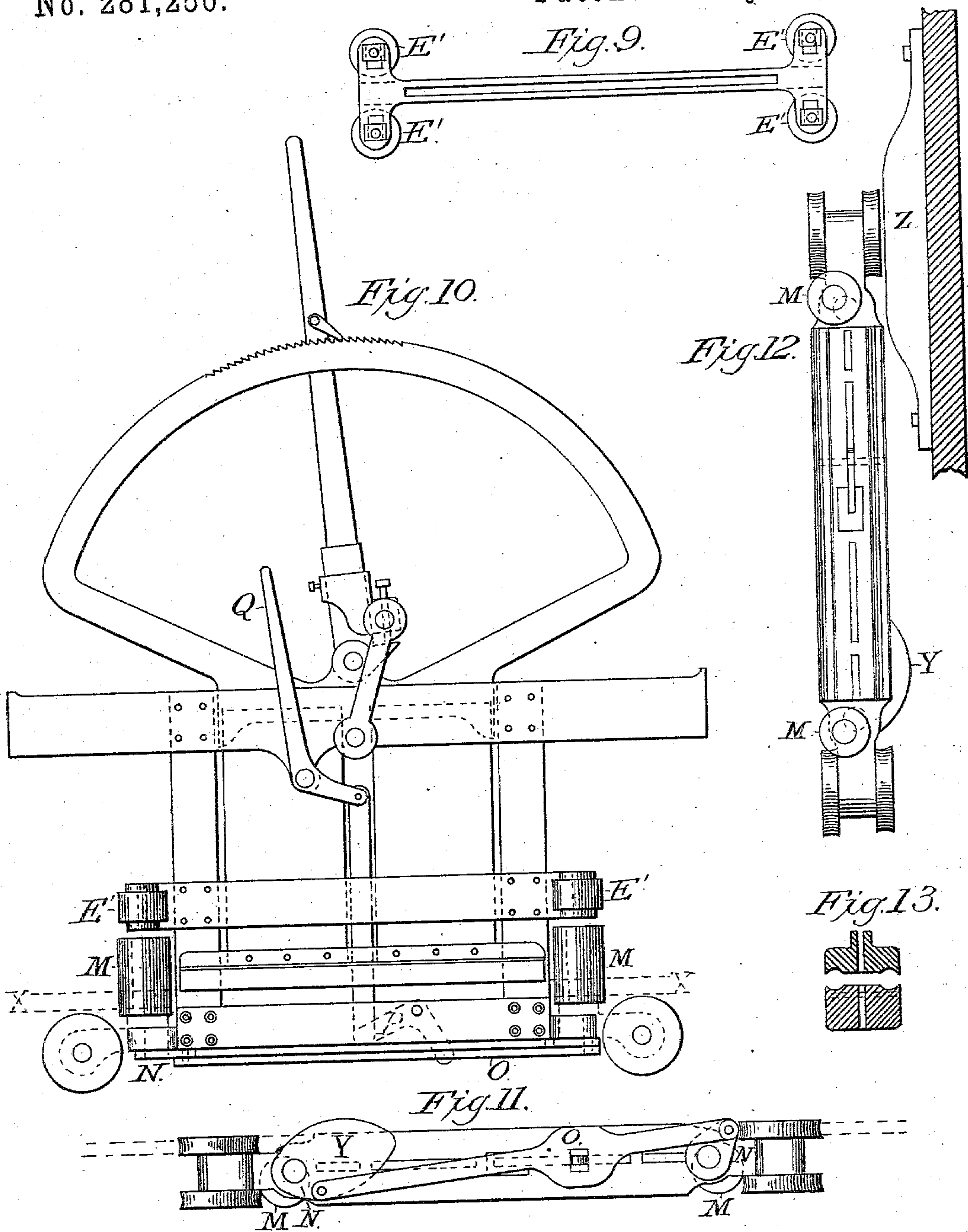
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UNITED STATES PATENT OFFICE.

CHARLES F. FINDLAY AND DANIEL J. MILLER, OF CHICAGO, ILLINOIS.

TRACTION-ROPE RAILWAY.

SPECIFICATION forming part of Letters Patent No. 281,256, dated July 17, 1883.

Application filed March 31, 1882. (No model.)

To all whom it may concern:

Be it known that we, CHARLES FARQUHAR FINDLAY and DANIEL J. MILLER, citizens, respectively, of Great Britain and of the United States, and residing in Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Traction-Rope Railways, of which the following is a specification.

The chief defect in traction rope railways as hitherto constructed has been that, in case of the breakage of a cable, the traffic of the road is suspended, or must be carried on by horses until repairs can be effected. We propose to overcome this defect by employing two cables instead of one, running in the same direction in one tunnel at about the same speed, and each carrying under normal conditions a share of the traffic, but so designed that the stoppage of one cable does not affect the continuous working of the other, which carries on the traffic during the interval for repair, just as on the roads hitherto constructed. By using duplicate cables in this manner we also gain the advantage of being able to use smaller cables, and therefore smaller sheaves and lighter machinery in general. The use of duplicate cables necessitates certain devices for receiving and dropping the cable, which are described fully below, and we have invented also an improved form of gripping apparatus, which is applicable not only to our duplicate cables, but to the single cable as now in use.

Our invention consists, also, in a more substantial, economical, and simple construction of road-bed than has hitherto been in use, and in means whereby a flat rail may be used and car-wheels without flanges.

Figure 1 is a cross-section of the roadway, taken at the shallowest part of the tunnel, and having so much of the road-bed removed as would obscure the castings. Fig. 2 is a plan of the castings in place. Fig. 3 is an enlarged plan of the guide-rollers. Fig. 4 is a longitudinal section of the tunnel, showing the gripping apparatus in its connection both with the car and the cable. Fig. 5 is a sectional elevation, showing the sheaves by which the cable is guided from a vault in the street to its line in the tunnel. Fig. 6 is a plan of the same

sheaves, showing the lines of the outgoing and incoming cables. Fig. 7 is a plan of one of the sheaves in Fig. 5. Fig. 8 is an end elevation of the sheaves in Fig. 5. Fig. 9 is a plan of the guide-rollers, shown in connection with the grip. Fig. 10 is a side elevation of the grip. Fig. 11 is a plan of the grip inverted. Fig. 12 is a plan of the lower jaw of the grip. Fig. 13 is a section through the jaws of the grip.

A' A' are the two cables, each supported by an independent set of carrying-pulleys, B' B', and disposed symmetrically about the center line of the tunnel. These cables travel at nearly the same speed in the same direction, and each one under ordinary circumstances draws a portion of the cars on the road, the simplest arrangement being that each alternate car takes the same cable. Thus the first, third, fifth, &c., cars connect with the right-hand cable, and the second, fourth, sixth, &c., with the left-hand cable. The distribution of the traffic between the two cables can be varied at will, however, for either cable can be connected with the car at the option of the driver. In case of the stoppage of one cable from any cause, the cars drawn by that cable are disconnected from it, by means hereinafter described, and may be conveyed each by the car ahead of it, or by that behind it, (which are using the cable still running,) up to the end of the track, where they can connect with the running cable; or, if means are provided for the purpose, they may connect with the running cable at whatever point they may happen to be when the stoppage occurs.

The pulleys B' B' are mounted in an enlarged part of the tunnel, forming a pit, C, which serves to collect the drainage of the tunnel. The pit C connects with the main sewer of the street by a pipe, D, or, when possible, may be made to open directly into the sewer, in which case it serves to ventilate the sewer. The grip, (which may be of any pattern which is adapted to take a cable on either side of the slot,) is carried by a frame mounted directly on the axles of a four-wheel truck. This truck carries the forward part of the car in the manner usual with steam-railroad cars, while the rear part of the car is carried by a single axle and a pair of wheels in the manner

usual with horse-cars. All the wheels have flat rims, and run on flat rails of the section shown in Fig. 1 or other suitable section, and the rails may be either fastened to timber stringers resting in shoes forming part of the castings I, as at H', or may be secured directly to the shoe, as at H², and bear on the concrete of the road-bed between the shoes. The grip is actuated by a lever or a hand-wheel controlled from the platform at the front of the car, so that the driver may have a good look-out and may be isolated from the passengers.

E' E' are rollers mounted on the gripping apparatus and running on the surface F of the castings I. These rollers serve to guide the car on the track, and the hind wheels are guided by similar rollers, E², mounted on a frame carried by the rear axle, and stayed from longitudinal motion by the pieces G G. Between the journals of the rollers E' E² and the supporting frame-work are interposed rubber or other springs, occupying the space K in Fig. 3, in order to relieve the frame-work from sudden strains caused by oscillation of the cable or any swaying of the car.

I I are castings, which form the upper part of the tunnel and the slot. They are kept in place by the mass of concrete in which they are embedded by being accurately fitted and bolted together at L, and by being anchored down by the screw-bolts J, which have a large washer, on which rests a mass of concrete or other heavy material of the road-bed. The bolts J may pass through any suitable part of the castings remote from the slot; but preferably we place them in the chairs, as shown at H' H². The castings I are strengthened at intervals by vertical webs outside the slot. The edges of the slot may be case-hardened, and if at any time they should be worn so far as to injure the road they may be renewed by bolting or riveting angle-iron bars along the outside of the castings of such thickness as to raise the slot to its original level.

In Fig. 10, M M are rollers mounted on spindles carried each by one arm of a bell-crank lever, N, of which the other arm is hinged to the end of a sliding piece, O. The piece O is suspended from these bell-cranks below the lower jaw of the grip, and in the middle of it is a slot, in which fits the end of one arm of another bell-crank, P, of which the other arm is connected with a hand-lever, Q, as shown in Fig. 10.

The operation of this mechanism is as follows: The rollers M being in the position shown in Fig. 11, and a cable being supposed to be in the grip on the other side of it from the rollers, if it is desired to throw out the cable, the driver moves the lever Q to the left, which causes the crank P to turn, the piece O to be thus pressed to the left, and thus the rollers M to be moved across the grip by the crank N, thus forcing the cable out of the grip. When it is desired to take the cable again, the rollers M can be set on either side, as may be desired,

and so, where there are two cables in the tunnel, the cable which it is not wished to connect with will be excluded from the grip. If at any time it is desired to take both cables in one grip, the rollers M can be removed. One of the bell-cranks N is formed with the projecting piece Y, which projects outside the grip on the side opposite to the rollers M. When the car arrives at the end of its journey, or at a place where it is desired to throw out the cable every time, if the cable has not been thrown out, the projection Y strikes against the projection Z, firmly fixed to the side of the tunnel, which turns the bell-cranks and throws out the cable, thus providing that the car can never pass that point with a cable in the grip.

At the point where it is desired to attach the cars to the cable we provide elevating-sheaves R R, which raise the cables to such a level that they can be received by the grip. These sheaves are mounted in frames S S, as shown in Figs. 5 and 8, which frames are pivoted on axles T, carried in fixed bearings U U. Each sheave-frame has on the inside a curved guard, V, (see Figs. 5 and 7,) and when the car comes along the track to connect with a cable the grip, striking the guards V, separates the sheaves and passes between them, the sheaves afterward falling back to their proper places by their own weight, and being held there by the stop W. The dotted line X X shows the line in which the cable is held by the grip, and X' X' (see Figs. 5 and 6) shows the normal line of the cable when not so held. The intersection of these lines, in Fig. 5, gives the point at which the cable is received by the grip.

We do not here claim the use of an elevating-sheave in fixed bearings for enabling a cable to be received into a gripper; but

What we do claim, and desire to secure by Letters Patent of the United States, is—

1. In that system of traction in which two cables are used in connection with a double gripper adapted to take either cable, the two cables A' and A², combined with two elevating-sheaves at about the same point of the road, thus forming an arrangement by which any car on the line may connect with and be drawn by either cable, substantially as set forth.

2. In combination with the cable and the guiding-sheaves arranged below the travel of the grip, the elevating-sheave R, frame S, and rock-shaft T, adapted to raise the cable to the level where it may be gripped or released, as set forth.

3. In a gripping apparatus for traction-rope railways, the rollers M, actuated with a lateral motion to throw out the cable at any desired point, or to prevent it from being received, substantially as described.

4. The cranked lever N and sliding piece O, in combination with rollers M, arranged to operate as described, and for the purposes specified.

5. The cranked lever P, connecting-rod, and hand-lever Q, forming, in connection with the

lever N, sliding piece O, and rollers M, a combination for operating the gripping apparatus of a traction-rope railway, substantially as described.

5 6. In combination with the lever N and rollers M, the piece Y, projecting from the gripping apparatus, together with the projection Z, fixed to the side of the tunnel, for the purpose specified.

10 7. In forming a tunnel for a traction-rope railway, the castings I, whose edges form a continuous surface, F, and having cast with them the chairs, substantially as described.

15 8. In combination with the frame-work of the tunnel and the track-foundation therefor, the anchor-bolts J, firmly uniting the same, substantially as described.

9. In a traction-rope railway, the combination, with the ways F of the tunnel and the flat-topped rail, of a car having unflanged 20 wheels and horizontal rollers arranged upon a projection from the car extending through the slot of the tunnel, substantially as described.

10. In combination with the gripping apparatus of a traction-rope railway, the horizontal rollers E, adapted to run upon the ways F 25 of the tunnel, and spring-cushions K, substantially as described.

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FRED I. FEE.