Feb. 24, 1931. A. H. MÜLLER 1,794,089

SUSPENSION RAIL TRACK SYSTEM

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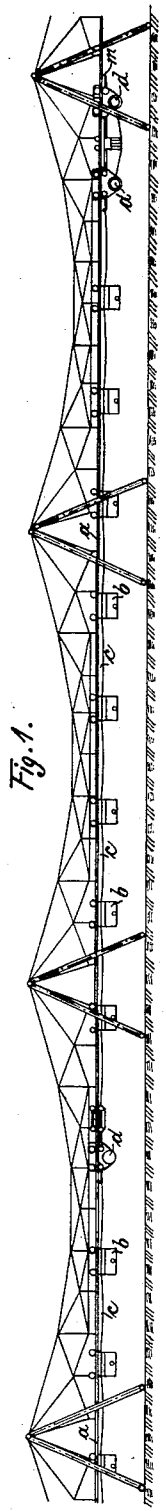


Fig. 1.

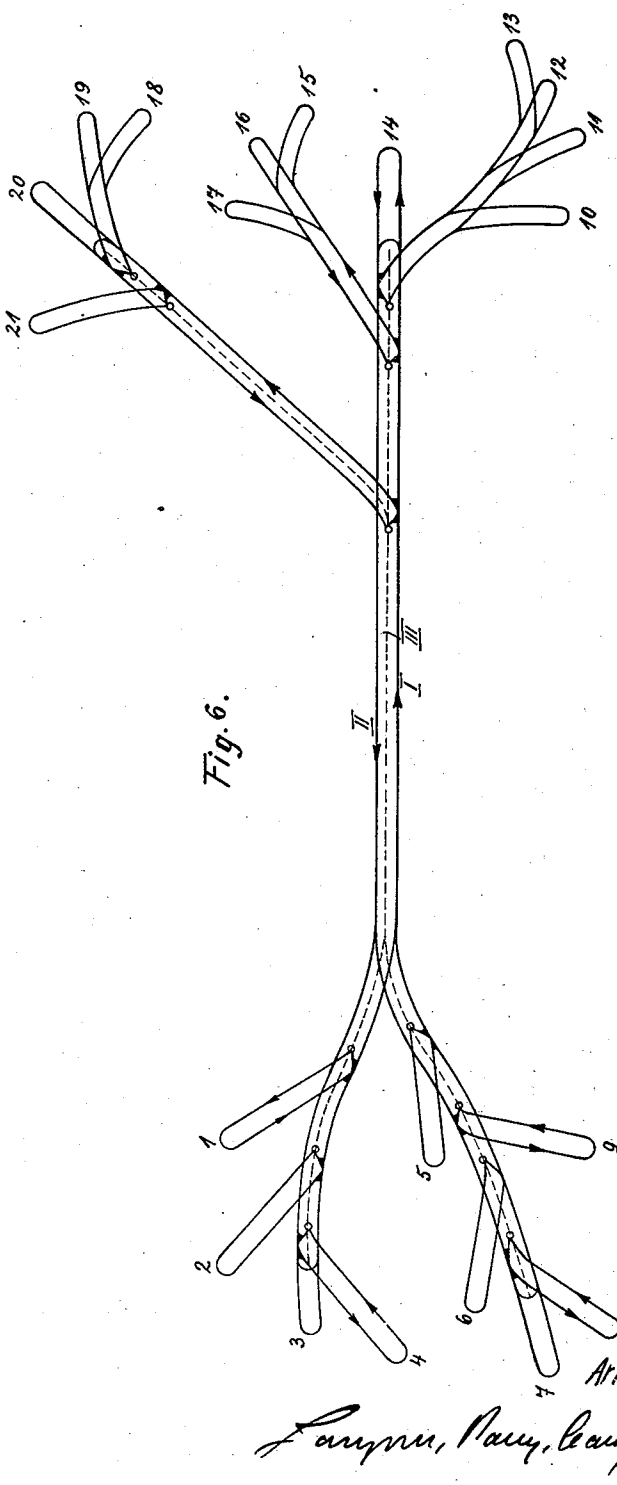


Fig. 6.

INVENTOR
Arthur H. Müller
64
Lanyon, Parry, Leadr Lanyon
AH'45

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Fig. 2.

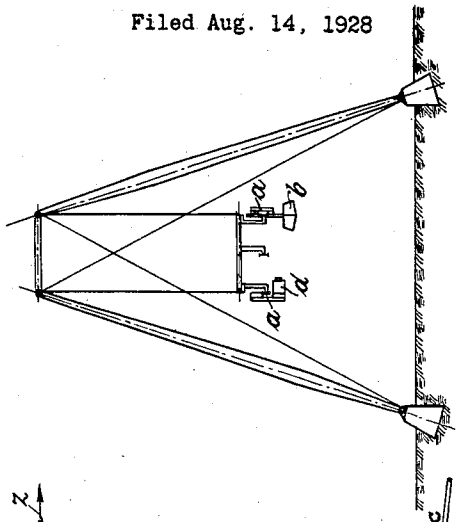


Fig. 5.

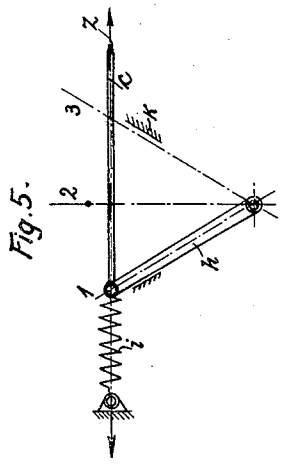


Fig. 3.

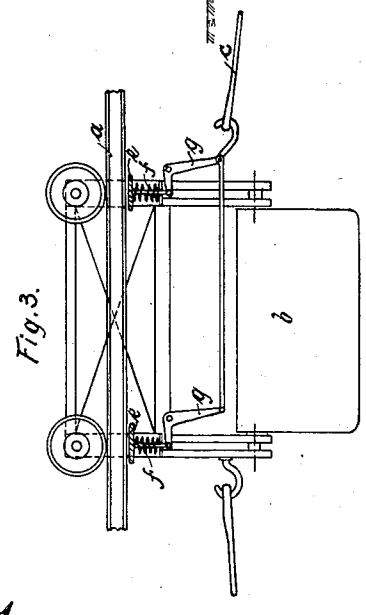
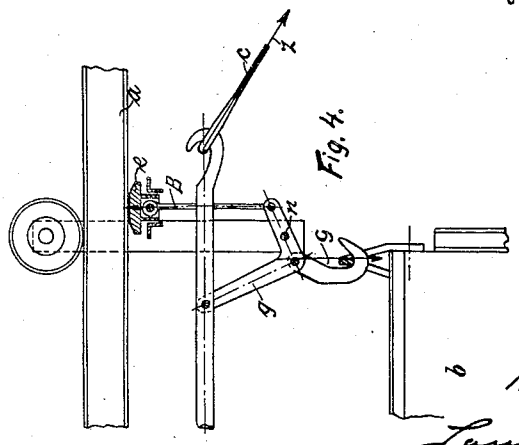


Fig. 4.



INVENTOR
Arthur H. Müller
by
Lauman, Paul,
Card & Lauman
Att'ys

Patented Feb. 24, 1931 1,794,089

UNITED STATES PATENT OFFICE

ARTHUR HUGO MÜLLER, OF BLANKENESE, NEAR HAMBURG, GERMANY

SUSPENSION-RAIL TRACK SYSTEM

Application filed August 14, 1928, Serial No. 299,589, and in Germany August 27, 1927.

The subject-matter of the present invention is a novel suspension-railway principally adapted for the conveyance of loads of any kind, especially of bulk-goods over short and long distances. It consists of a suspended rail track on which the separate receptacles or trucks run some distance apart one after the other or in trains or groups; the trucks which are connected with one another by non-rigid traction-means (ropes), are moved by tractive machines or motors. In order to keep the trucks the proper distance apart from one another, any or all of them are furnished with brakes which come into operation automatically as soon as the tractive force in the train of trucks goes below a certain limit. The same principle may also be applied for automatically controlling the tractive force of tractive machines or motor cars running in about the middle of such a train. By this means it is rendered possible to combine single trains or trucks having their own motive power, into trains of any length.

The automatic braking of the trucks as well as the controlling of the tractive force of the machines or motors takes place in such a manner that a continuously acting force tends to set the brakes into operation or to move the operating lever for said brakes to the braking or stopping position, whilst the tractive force existing in the train of trucks counteracts the said force, and tends to counterbalance the braking effect. The movement of the train is therefore initiated and controlled from its front end. As soon as the front end of the train goes at a slower rate or comes to a standstill, the tractive force exerted in the middle of the train will decrease and the brakes upon the trucks in the rear will automatically come into operation. The same action will take place when the rear end of the train increases its speed relative to the front end in down-hill running.

By this novel invention, nearly automatic operation of very long trains is secured which will need hardly any accompanying attendants and which, on account of its length will balance ascending and descending gradients to a high degree, and therefore the working-expenses are reduced substantially. The extraordinary favourable distribution of the loads on such a railroad renders possible also a cheap construction of the plant. The main advantage of the present suspension-railway consists however in that its range and application are not limited by a fixed rope-loop, but owing to its operation by train-loads as an ordinary railway it may be extended to any length and branched in any desired manner.

Finally as compared with the ordinary railways the present plant possesses the advantages of all suspension-railways, namely, that it does not impede in any way the erection of buildings and the traffic on the surface of the earth, and that with regard to its construction and its operation it is much cheaper than the said railways.

The present invention combines therefore the advantages of all known systems of electro-suspension-tracks, aerial wire-rope ways having continuous operation and ordinary railroads, thereby avoiding in a high degree the drawbacks of the said systems.

In the accompanying sheets of drawings and the subsequent description the invention is explained so far as is necessary for its understanding.

Fig. 1 is a longitudinal lateral elevation of a part of the improved suspended rail track showing a construction which is especially adapted for great spans. Fig. 2 shows on an enlarged scale a cross sectional view of Fig. 1. Fig. 3 represents on a still larger scale a single truck upon the said suspended rail track, provided with an automatic brake-device. Fig. 4 shows a modified form of the brake-device. Fig. 5 is a diagram illustrating the automatic engaging and disengaging means of a motor dependent on the tractive force existing in the respective train of trucks. Fig. 6, lastly, is a diagrammatic plan of an entire plant.

Referring to the drawings in which like reference characters indicate like elements in the various views, *a* indicates the rail upon which are suspended in separated relation the trucks *b*. The trucks are connected to each

other and also to the electric tractive engines or motor cars *d* by the ropes or cables *c*.

The separate trucks are provided as required, with braking devices which come automatically into operation as soon as the traction or strain in the connecting ropes *c* or the like decreases for any reason, for example in down-hill travelling or when the front end of the train comes to a standstill. A preferred simple construction of such a brake is shown in Fig. 3. The brake-blocks *e* are urged by the springs *f* against the lower flange of the rail *a*, whenever the tractive force or strain exerted in the rope *c* acting through the bent levers *g* does not overcome the elastic force of the said springs. The tractive force existing in the train of trucks is thus transmitted to the levers *g* and with a desired transfer-ratio pass the springs *f* which are designed to urge the brake-blocks *e* against the rail *a*. By this arrangement there is attained also a smooth starting of the train of trucks, because the springs *f* serve as a substitute for the coupling-springs generally used in railways.

Instead of the resilient force of the springs *f* the weight of the truck may be employed, as shown in Fig. 4, to supply the necessary braking pressure. The truck-receptacle is suspended from the levers *g* which are pivoted at *n* to suitable hangers of the truck-frame. The braking pressure B results, as is self-evident, from the equation of the moments of the forces G, B and Z around pivot *n* (G=weight of the truck, B=braking pressure. Z=tractive or tensile force in the train of trucks).

The tractive force of the motor cars running in the middle section of a long train are regulated in a similar manner, as shown by Fig. 5. The operating lever *h* of the motor is urged by a spring *i* to the position 1 whereby the motor is braked or stopped. Upon the operating lever *h* the connecting rope *c* connected to the preceding truck or motor is acting against the spring *i*, tending to set the motor in operation. In case there is exerted from the front end of the train on the operating lever *h* a tractive force which overcomes the elastic force of the spring *i*, the motor is actuated automatically, but it develops only so much tractive power as is necessary to create in the front connecting rope a force corresponding to the backward pulling force of the spring *i*. When the motor is in full operation, that is to say, when the operating lever *h* is in the position 3 resting against the stop K, a compensation of the tractive forces in the front and aft connecting ropes takes place by way of the motor. This may occur, when the train is travelling over an elevation.

The front end of the train must, of course, be capable of taking all ascents by its own power. It may therefore be convenient to have at the front end two motors, as shown in Fig. 1, and if necessary to man the same with a person as a conductor. If however the front end of the train, as well as the other sections of the train, are not equipped with any conductor, care must be taken so that the motor or motors of the train are automatically disengaged or thrown out of gear and come to a stop when the front end of the train strikes against an obstable for example against the rear end of a preceding train, and also that the motor or motors will automatically start as soon as the obstacle in question has been removed. To attain this object it is only necessary to reverse the construction disclosed in Fig. 5, that is to say, to connect the yielding buffer *m* (Fig. 1) with an appropriate means for controlling the motor. As long as the buffer remains in a repelled position the motor will remain inoperative.

By the above described action of the braking devices and of the motors the direction of movement of the train is always controlled so that the train can not run backward. The operation in connection with the present plant is therefore accomplished in a circular course. The Fig. 6 demonstrates in what manner such a plant having numerous ramifications or branch track-lines may partically be performed. The points designated by 1, 2, 3 and so on are places for loading and respectively for unloading goods which places are joined with the main track line by track loops and switches. The separate trains which are to be charged or discharged on said track-loops are combined on the main track, as far as possible or serving the purpose to form a long train and are, according to demand, separated again in a similar manner for discharging their loads or receiving new loads. The coupling or uncoupling of the trains may be effected automatically. The engines or motor cars running at the front end of the train-sections may be deposited or stored, when they are dispensable on the main track, on special waiting-tracks, for example on the track III, until they may be placed again at the front end of a branching train.

With tracks strongly supported it may be advisable to pass the track III situated between the tracks I and II entirely through the plant. The said track III may then serve as a revisional and auxiliary track in case of repairs to be executed.

I claim:

1. A track system comprising a suspended rail, trucks in spaced relation supported for movement upon said rail, tractive means for said trucks, non-rigid connections between said trucks and means for maintaining the spaced relation of said trucks when said tractive means is decreased below a predetermined limit.

2. A track system comprising a suspended rail, a series of trucks forming a train car-

ried by said rail, motor cars for said train disposed at various points throughout said train, said motor cars and trucks being in spaced relation, non-rigid connections between said trucks and motor cars and means for maintaining the spaced relation of said trucks and motor cars.

3. A track system comprising a suspended rail, a series of trucks forming a train carried by said rail, motor cars for said train disposed at various points throughout said train, said motor cars and trucks being in spaced relation, non-rigid connections between said trucks and motor cars, and means operable by said non-rigid connections for controlling the tractive force of the motor cars disposed in the central and rear end of said train.

In testimony whereof I have signed my name to this specification.

ARTHUR HUGO MÜLLER.