(No Model.) 2 Sheets—Sheet 1.

C. J. VAN DEPOELE.

CABLE RAILWAY SYSTEM.

No. 398,294. Patented Feb. 19, 1889.

Fig. 1.

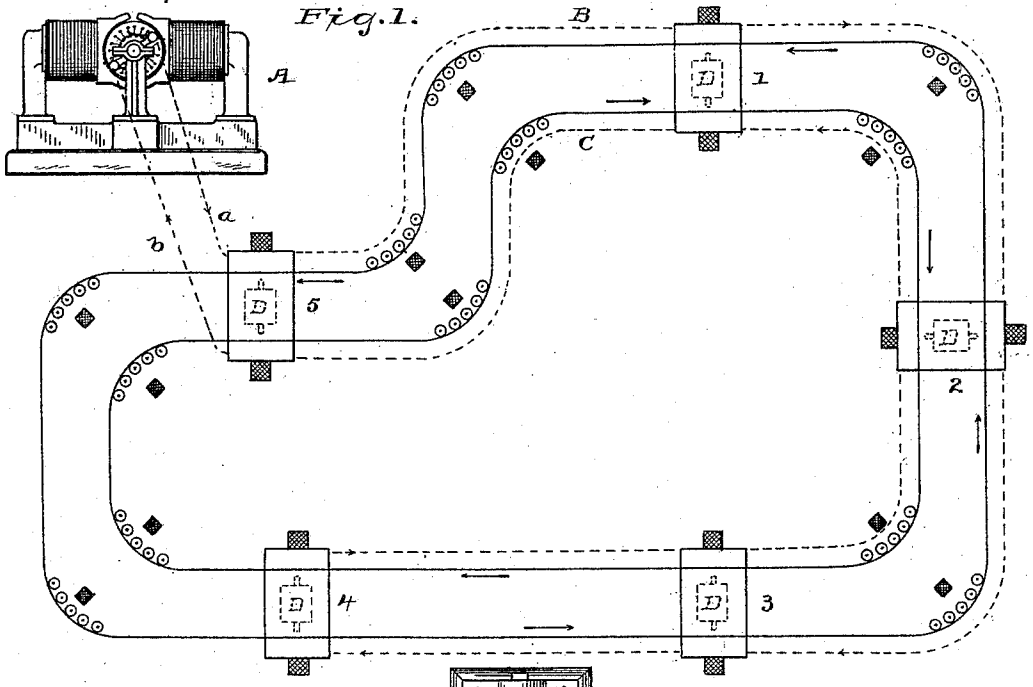


Fig. 2.

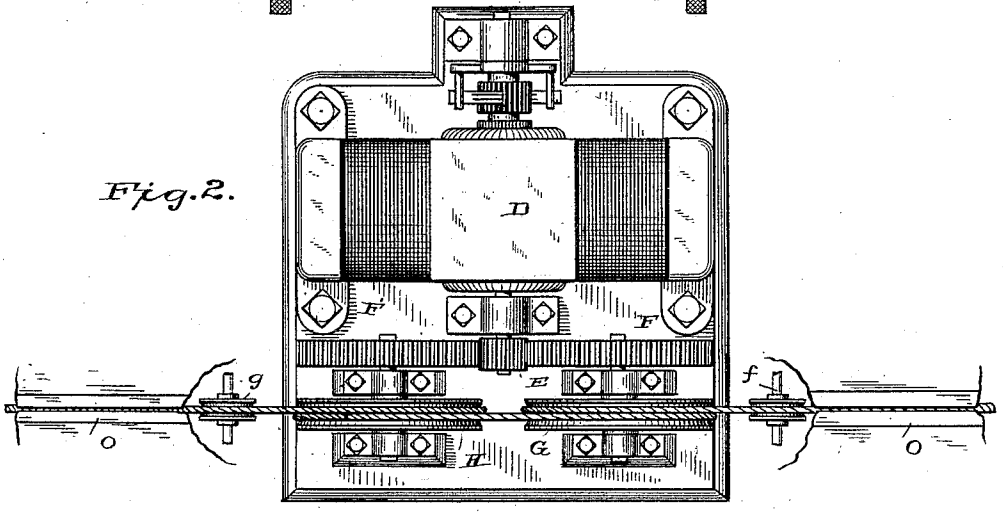
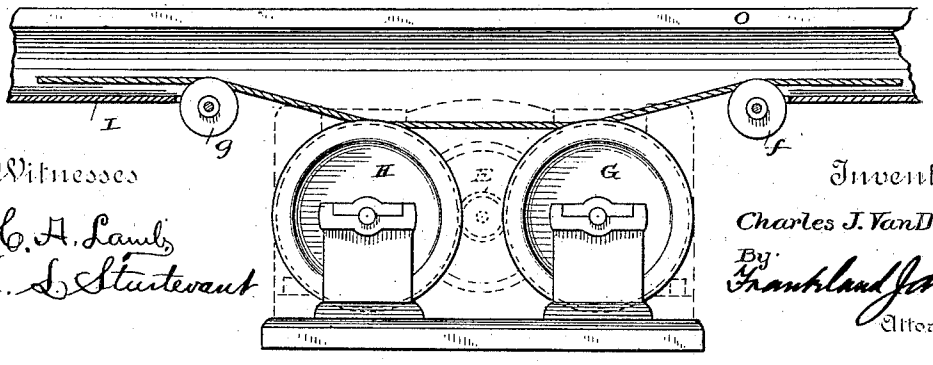


Fig. 3.



Witnesses

H. A. Sault,

C. L. Stuntevant

Inventor

Charles J. VanDepoele

By Frankland & Morsell

Attorney

N. PETERS, Photo-Lithographer, Washington, D. C.

(No Model.) 2 Sheets—Sheet 2.

C. J. VAN DEPOELE.

CABLE RAILWAY SYSTEM.

No. 398,294. Patented Feb. 19, 1889.

Fig. 4.

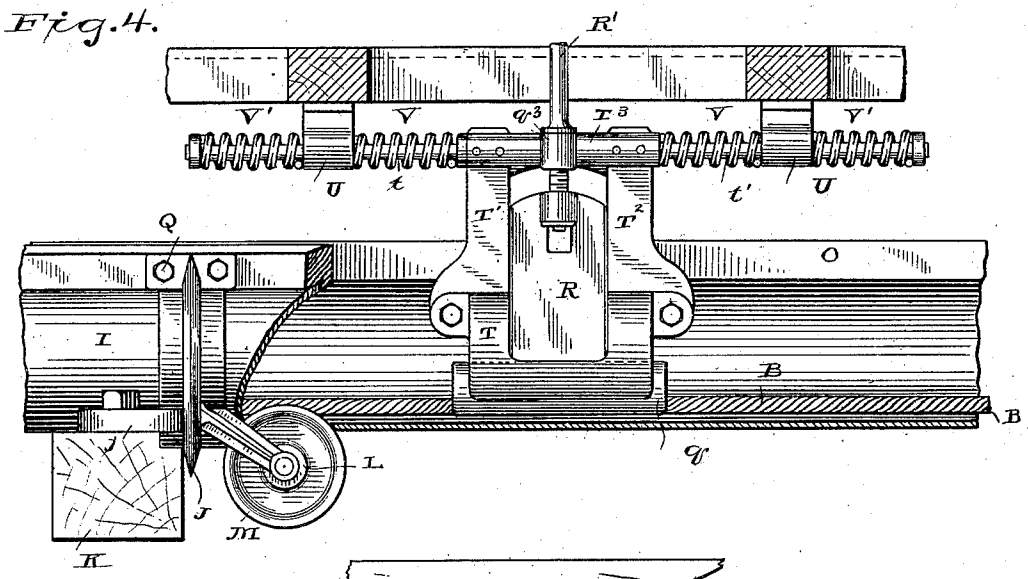
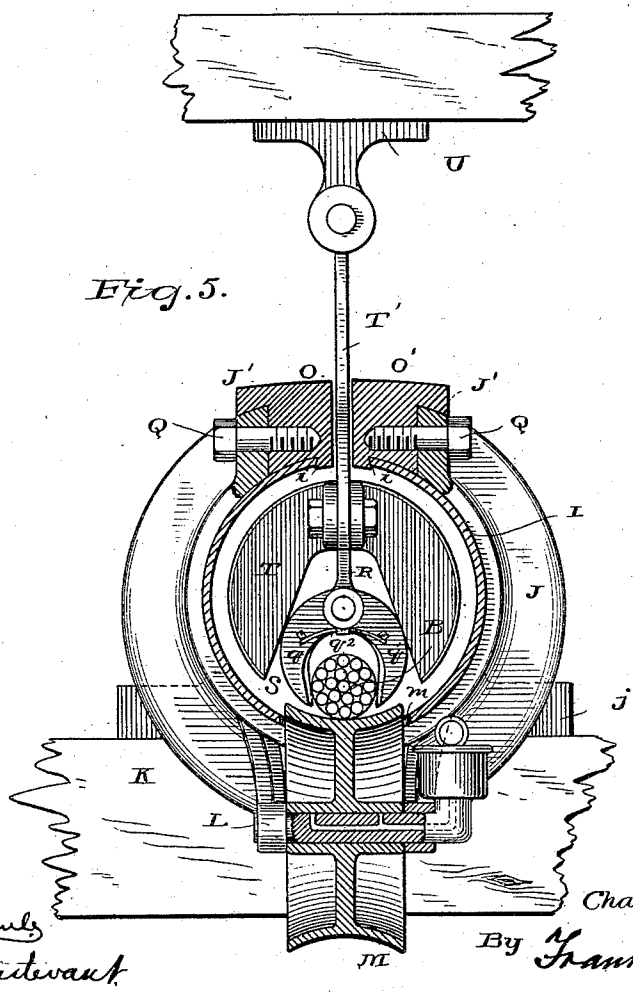


Fig. 5.



Witnesses

H. A. Lauls

C. L. Stutevant

Inventor

Charles J. Van Depoele

By Frankland & Jammes.

Attorney

N. PETERS, Photo-Lithographer, Washington, D. C.

UNITED STATES PATENT OFFICE.

CHARLES J. VAN DEPOELE, OF LYNN, MASSACHUSETTS.

CABLE-RAILWAY SYSTEM.

SPECIFICATION forming part of Letters Patent No. 398,294, dated February 19, 1889.

Application filed October 17, 1888. Serial No. 288,343. (No model.)

To all whom it may concern:

Be it known that I, CHARLES J. VAN DEPOELE, a citizen of the United States, residing at Lynn, in the county of Essex, State of Massachusetts, have invented certain new and useful Improvements in Cable-Railway Systems, of which the following is a description.

This invention comprises an improved system of operating what are known as "cable railways," together with certain adjunctive devices co-operating to form a complete and practical organization.

It is well known that in the operation of cable railways a very large proportion of the necessary power is absorbed in the movement of the cable itself, irrespective of the number of cars in motion. Ordinary traction-railways are commonly many miles in length, and the strain and consequent wear upon that portion of cable nearest the power-station is at all times and under all circumstances very great, since the entire strain of the whole line is always upon that part of the cable passing the winding-drum. The strain of course decreases with the distance from the power-station; but as all portions of the cable must be subjected thereto during its movement, the wear upon the cable is great and its life consequently short. Furthermore, so large a percentage of the total power being required to move the cable without any cars, it is impracticable to save any considerable portion of the power when fewer cars are being operated. Another disadvantage of the system employing a single power-station is that the friction occurring on curves must all be overcome by a direct pull upon the cable at a single point.

According to my invention the power by which the cable is moved may be all controlled from a single point, but subdivided and placed at desirable points along the line, the exact location of the winding-engines being determined by the nature of the road, they being placed with reference to the curves, grades, or other circumstances. For this purpose winding-engines operated by electric motors are provided at suitable points along the line, the distance between them being that through which the power can be most economically supplied to the cable. The motors are arranged in suitable sub-surface apartments or stations below the conduit where the cable can be conveniently operated upon. The electric-power stations are all connected with a suitable generating-station, which may be located at any convenient point and need not necessarily be directly adjacent to the railway, as is the case with the power-stations at present in use.

In a system such as referred to it will be possible to save power when fewer cars are being operated, for the reason that a suitable number of electric-power stations are disposed along the line and each motor will only be required to move a relatively short section of the cable, under which circumstances only a small part of its power will be absorbed in moving said cable, instead of, as with the single-station system three-fourths of the power being required to move remote portions of the cable.

In the accompanying drawings I have shown a form of apparatus capable of carrying out my invention. However, it is not limited to any particular form of device, except that the parts herein shown and particularly described are referred to in the claims.

Figure 1 is a diagrammatic view indicating the general arrangement of the system. Fig. 2 is a plan view of a motor and winding machinery. Fig. 3 is a side elevation of the winding machinery, conduit, and cable, with the motor indicated in dotted lines. Fig. 4 is an elevation, partly in section, showing the conduit, the grip, and devices for attaching the motor to the car. Fig. 5 is a transverse sectional elevation of the structure shown in Fig. 4.

Similar letters denote like parts throughout.

As indicated in Fig. 1, A is the generator supplying currents of electricity.

B C are endless traction-cables of a double-track railway.

1 2 3 4 5 indicate electric-power stations arranged along the line of way, each containing an electric motor and winding mechanism for engaging the cable and imparting movement thereto.

Supply-conductors *a b* extend between the generator A and the several electric-power

stations, the motors being connected and operated in multiple arc or series, as may be found most convenient.

A motor for supplying power to the cable is shown in Fig. 2, and may consist of any desirable form of electro-dynamic motor, D, the armature-shaft of which is provided with a pinion, E, meshing with gear-wheels F F′, upon the shafts of which are mounted winding-drums G H. Additional gear-wheels may be found desirable for still further reducing the speed of the motor, but the arrangement here shown will be found to work well. The peripheries of the drums G H are grooved to receive the cable B, which extends downward from the open lower parts of the conduit, and, passing over a pulley, *f*, is wound completely around the drum G, and passed thence and similarly wound around the drum H, from which it passes over a second pulley, *g*, back into the conduit. The cable being wound upon the drums in the manner indicated, will enter and leave in the same direct line. That portion of the conduit passing each electric power-station is formed with a wide opening or slot in its lower portion, through which opening the cable is deflected downwardly to the winding-drums, which, being in line with the conduit, will require no deflection or interruption of the surface-slot.

A desirable form of conduit for use with my system comprises a cylindric metallic tube, I, which is formed with a continuous slot or opening having beveled edges *i i*. The tube I is sustained at intervals by strong, metallic yokes J, which are provided with lugs or extensions *j*, adapted to rest upon and be supported by the cross-ties K. Arms L are also formed upon or attached to the yokes J, between which arms are journal-supporting pulleys M. Openings *m* are also formed in the bottom of the conduit-tube at suitable intervals, and through these openings the pulleys M extend a suitable distance above the bottom of the conduit for supporting the cable and preventing injury thereto by rubbing contact with the conduit-tube. Surface bars O O′ fit snugly along the edges of the slot in the tube, and are also provided with undercut projections engaging the beveled edges *i i*. The road-bars O O′ rest upon the upper edges of the slot in the tube I, and are also laterally supported by the upper extremities, J′ J′, of the yokes J, to which they are secured by transverse bolts Q Q. With this arrangement the road-bars are securely attached to the yokes J, and also serve to sustain the tube I by reason of their connection with its edges, thereby preventing any possibility of their being sprung together by the action of frost or the passage of loaded wagons.

An improved gripping device especially adapted for use with my system comprises a pair of hinged metallic jaws, *q q′*, which are hinged together and depend from a strong metallic plate, R. The jaws *q q′* are provided with a spring, q^2, for opening them, and they are arranged in a V-shaped recess, S, on the exterior of a cylindric metallic block, T, through a suitable opening in which the plate R extends upward for connection to the grip-operating devices. The block T is attached to plates T′ T^2, extending vertically upward through the slot, and between the inner edges of the plates T′ T^2 the plate R is held and guided so that it may move vertically with respect to the plates T′ T^2. The upper extremities of the plates T′ T^2 are secured, respectively, to horizontal rods *t t′*, which move in and are supported by strong metallic brackets U, secured to the truck or frame of the vehicle to be propelled. The plates T′ T^2 are connected across their upper ends by a strong metallic frame-piece, T^3, which is formed with an apertured boss, q^3, at about its central portion, in which is supported a bar, R′, provided with a shoulder or other suitable means for maintaining it in position in the boss q^3, and is formed with a screw-thread at its lower extremity, said screw-threaded portion engaging a screw-threaded portion of the upper part of the plate R, whereby vertical movement may be imparted to said plate for raising and lowering, and thereby opening and closing, the gripping-jaws *q q′*.

It will be evident that the plates T′ T^2 and piece T^3 may be formed in a single piece, if desired. Heavy buffer-springs V V′ are placed upon the rods *t t′* between the ends of the piece T^3 and the brackets U U, and also between the extremities of the said rods and the said brackets, so that in starting the car the first effect of the power will be expended in compressing said springs, and the usual violent jerk be avoided.

The cable B is normally supported upon the carrying-pulleys M at a short distance above the bottom of the conduit, and in their lowest position the jaws *q q′* do not quite touch said pulleys, but they extend downwardly far enough to rest against the sides of the cable below its central line. The jaws *q q′* are rounded on their exterior and grooved on their interior, so that they taper toward their lower edges, which said edges normally engage the cable below its central line. If, now, bar R′ is rotated in the direction to move the plate R vertically, the jaws *q q′* will, by the wedging action of the V-shaped recess in the block T, in which they move, be moved toward each other, and their first action upon the cable will be to raise it, and this action being continued they will be clamped securely and tightly upon the cable with any desired degree of pressure, and on account of their rounded interior surface they will clamp the cable without their lower edges coming together. When the reverse movement takes place, the plate will be lowered and the jaws allowed to open, releasing and dropping the cable. It will thus be seen that when the cable is released the jaws are in position to

grasp it again. In passing the respective power-stations the cable should be released and the car allowed to proceed by its momentum until the power-station is passed, when the cable is again gripped and the car moved along its way. It may sometimes happen, however, that the cable would not be released at the proper time when approaching the power-station. In this event the cable will be forcibly pulled out of the grip without serious injury, since the opening between the lower edges of the jaws grasping the cable will not be much smaller than the diameter of the cable, and the cable itself being formed of a number of wires twisted together, it would, under such circumstances, be compressed sidewise, and flatten itself enough to come through the opening between the jaws.

From the foregoing, and notwithstanding the specific description of one form of apparatus capable of carrying out my invention, it will be understood that said invention, broadly considered, comprises the application of a plurality of winding-engines to an endless cable at separated points along said cable, irrespective of the character or nature of said engines. I find it particularly advantageous, however, to use electric motors in this connection, for the reason that a number of separate motors may be caused to operate simultaneously upon the cable, and all run at the same speed, whether they are or are not all delivering the same amount of power. Of course when so coupled and connected the tendency of one to run a little faster than the others may cause it to do a little more work; but self-regulating electric motors such as I propose to use will operate harmoniously together, and, furthermore, the propelling force of an electric motor being magnetic attraction, instead of fluid under great pressure, it is yielding to such an extent that no harm could come to the motors from one being in condition to develop more power than another. I have for purposes of illustration, however, in addition to the matters herein claimed, shown and described a gripping mechanism suitable for use in connection with the cable-operating devices.

Having described my invention, what I claim, and desire to secure by Letters Patent, is—

1. A cable-railway system comprising a continuous traction-cable and a plurality of power-stations located along the line of the cable, and a motive-power device at each of said stations for propelling the cable, substantially as described.

2. In a cable-railway system, the combination of a continuous traction-cable, a plurality of power-stations located along the line of the cable, and a separate source of motive power, and mechanism connecting said power with the cable at each power-station for simultaneously imparting movement thereto, substantially as described.

3. In an electric cable-railway system, the combination of a traction-cable, two or more separate sets of winding-drums engaging said cable at different points along its line, a source of electricity, and electro-dynamic motors in circuit with said source of electricity and connected to the winding-drums for supplying motive power to said drums to move the cable, substantially as described.

4. An electric cable-railway system, comprising a traction-cable, two or more power-stations located at suitable intervals along the line of said cable, winding-drums engaging the cable, and means for simultaneously operating said winding-drums located at each of said stations, substantially as described.

5. In an electric cable-railway system, the combination of a traction-cable, power-stations located at suitable intervals along the line of the cable, a conduit for the cable formed with openings along its bottom where it passes the power-stations, and winding-drums having grooved peripheries located below each downward opening in the conduit, substantially as described.

6. In an electric-railway system, the combination, with a traction-cable, of power-stations located at suitable intervals along the line of said cable, a conduit for the cable, said conduit being formed with an opening or slot along its bottom portion where it crosses each power-station, winding-drums G H, and guiding-sheaves *g f*, and a suitable motor, as D, mechanically connected to the winding-drums, substantially as described.

In testimony whereof I hereto affix my signature in presence of two witnesses.

CHARLES J. VAN DEPOELE.

Witnesses:
WM. A. STILES,
FRANKLAND JANNUS.