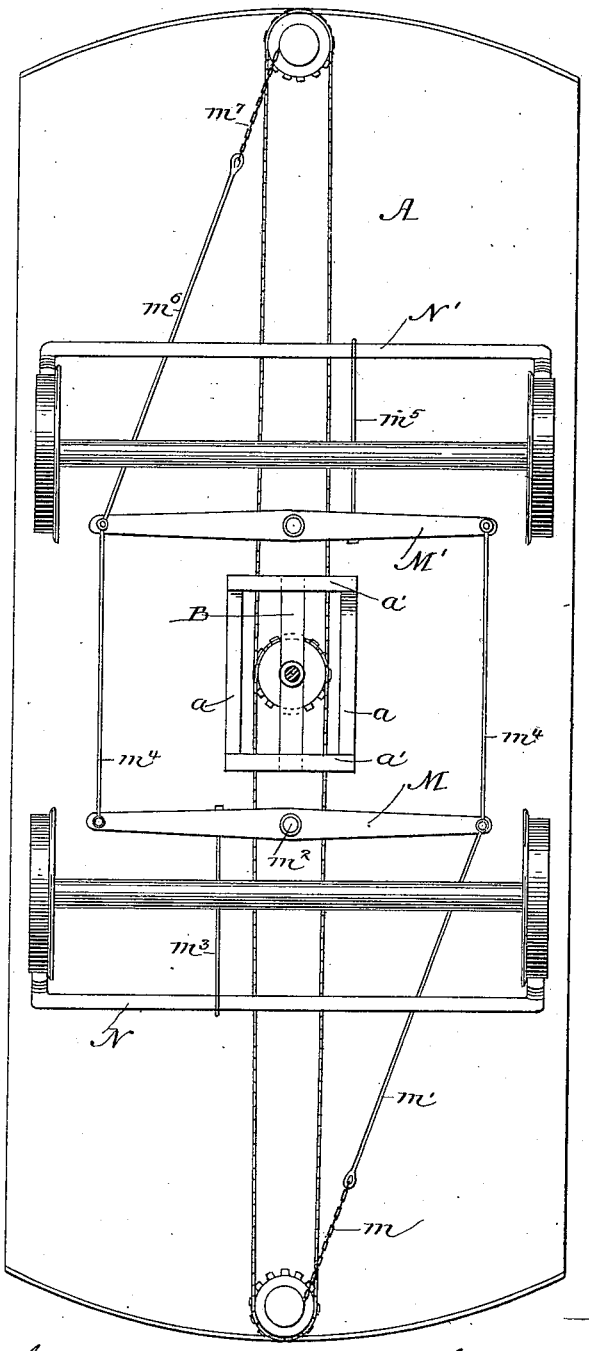
(No Model.) 4 Sheets—Sheet 1.

C. W. RASMUSEN.

CABLE RAILWAY APPARATUS.

No. 266,198. Patented Oct. 17, 1882.

Fig. 1.



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(No Model.) 4 Sheets—Sheet 2.

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CABLE RAILWAY APPARATUS.

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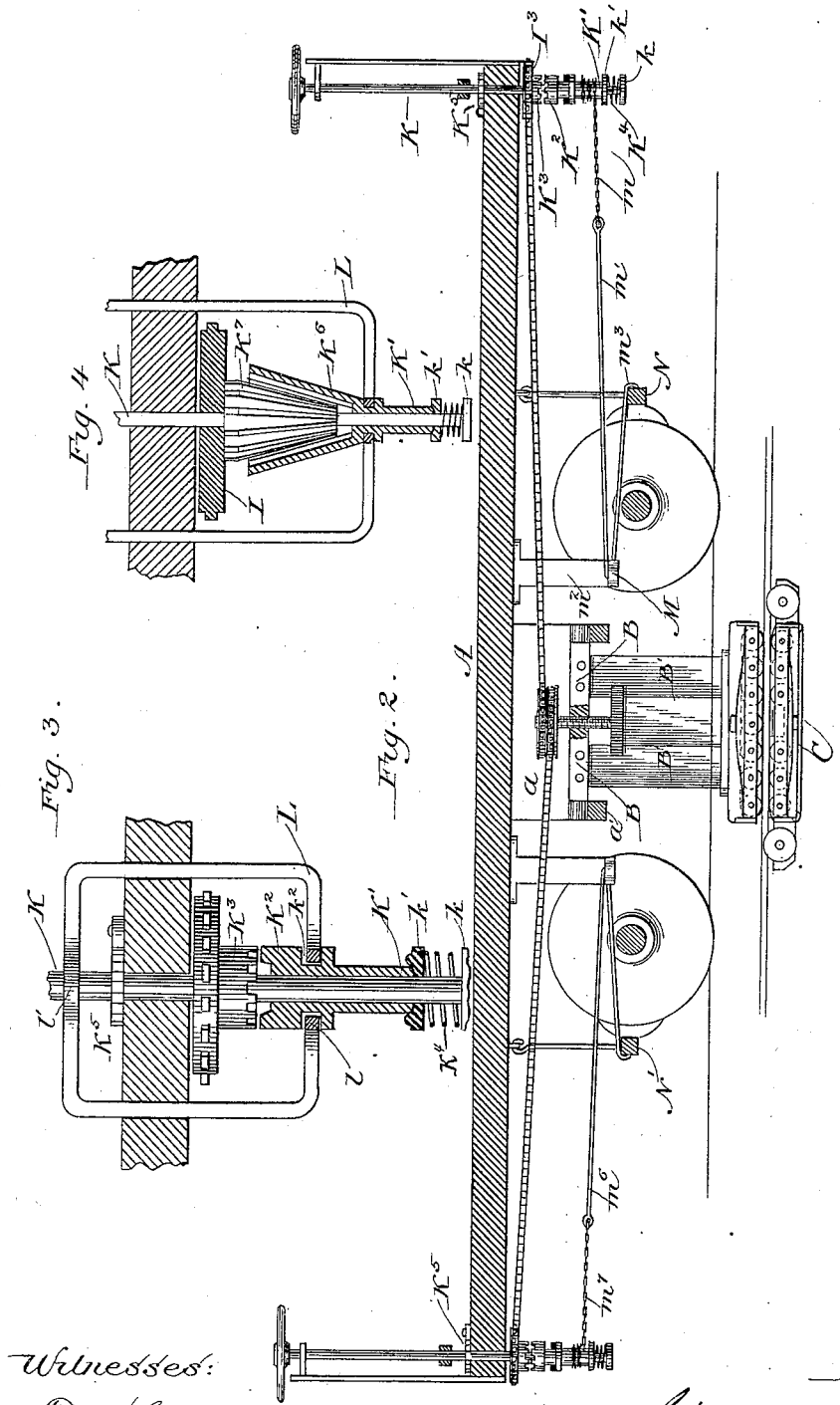

Fig. 4.

Fig. 3.

Fig. 2.

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CABLE RAILWAY APPARATUS.

No. 266,198. Patented Oct. 17, 1882.

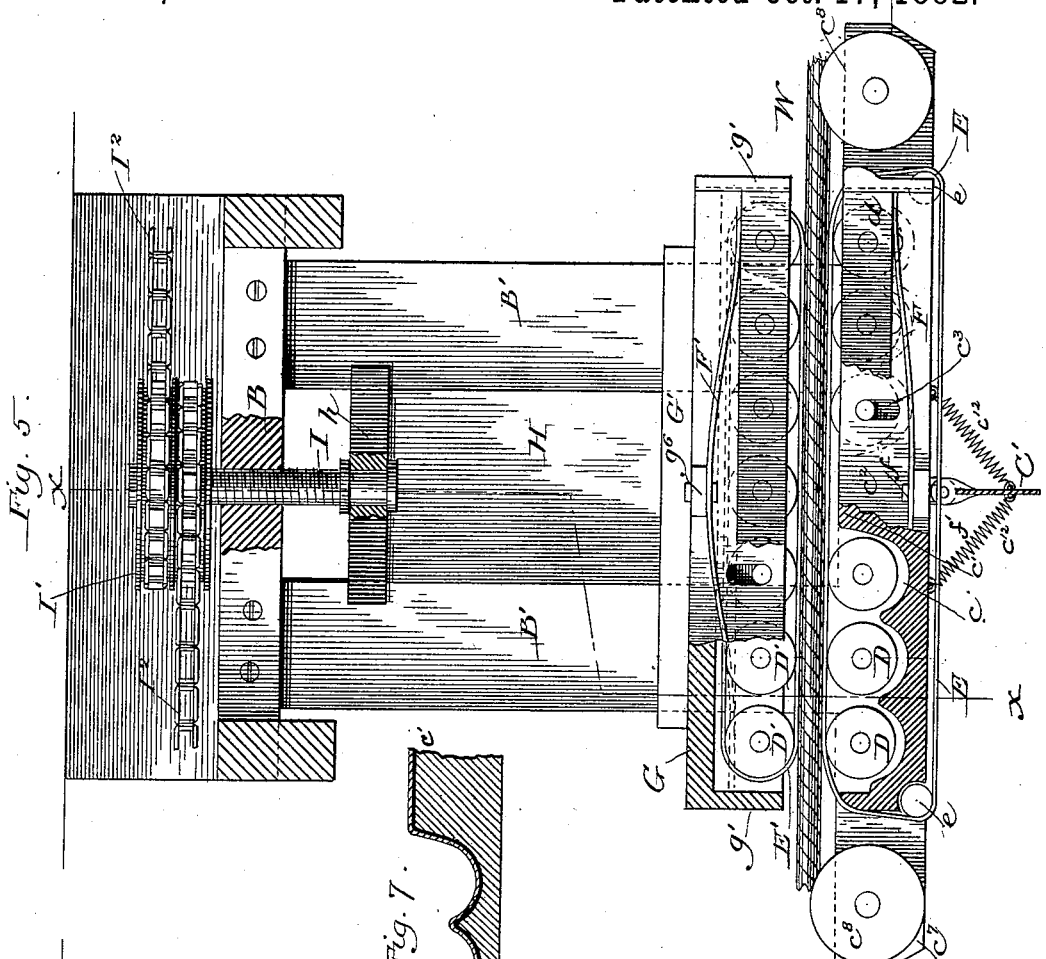

Fig. 5.

Fig. 7.

Fig. 6.

Fig. 6a.

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(No Model.) 4 Sheets—Sheet 4.

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CABLE RAILWAY APPARATUS.

No. 266,198. Patented Oct. 17, 1882.

Fig. 8.

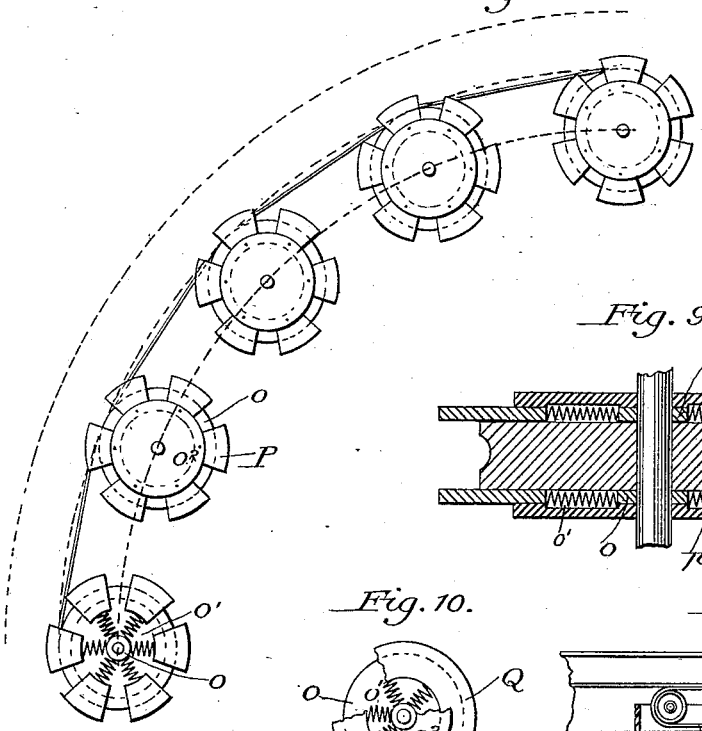


Fig. 9.

Fig. 10.

Fig. 11.

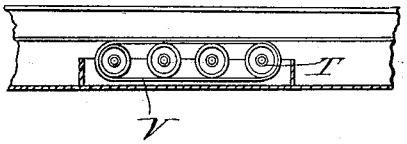


Fig. 12.

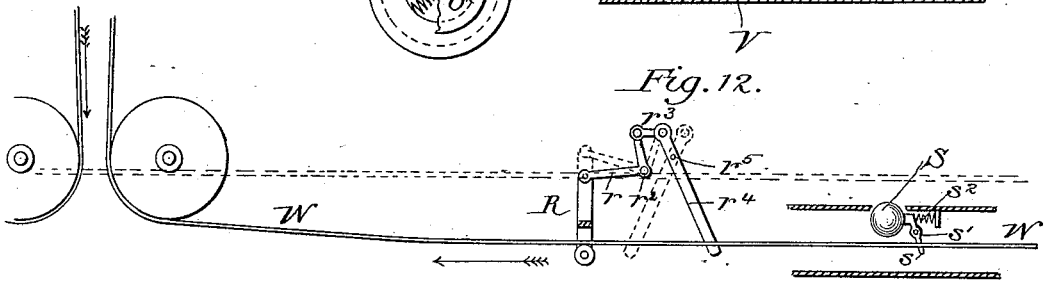
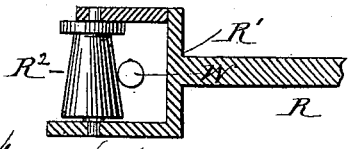


Fig. 13.



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UNITED STATES PATENT OFFICE.

CHARLES W. RASMUSEN, OF CHICAGO, ILLINOIS.

CABLE-RAILWAY APPARATUS.

SPECIFICATION forming part of Letters Patent No. 266,198, dated October 17, 1882.

Application filed March 21, 1882. (No model.)

To all whom it may concern:

Be it known that I, CHARLES W. RASMUSEN, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Cable-Railway Apparatus, of which the following is a specification.

My invention has relation to that class of railways wherein the propulsion of the cars is effected by means of an endless cable traveling in a tube or tunnel located in the center of the track, to which cable the car is connected, when desired, by means of a grip or clutch attached to and extending from the bottom of the same. Within the inclosing tube or tunnel it is customary to place sheaves or pulleys, over which the cable passes, and by means of which it is to some extent saved from friction, and at the curves of the roadway laterally-arranged pulleys are usually employed for a like purpose.

The object of my present invention is, first, to improve the construction of the grip or clutch by which the car is connected to the moving cable, and also the mechanism for operating said grip; second, to provide improved mechanism whereby the relative operation of the grip and the car-brakes can be readily and effectively controlled; third, to furnish the cable-tube at the curves or turns of the road with an improved construction of cable guiding and supporting pulleys; fourth, to provide a more effective means for supporting the cable within the body of the tube; and, fifth, to provide a suitable device by which, when necessary, the cable can be automatically drawn from the grip, and signaling mechanism, also, by which the engineer on the car will be notified before the cable is to be withdrawn, that he may unclamp the grip. These several objects of my invention I have accomplished by the apparatus hereinafter fully described and particularly claimed, and illustrated in the accompanying drawings, in which—

Figure 1 is a plan view of the bottom of the car inverted, showing the grip and brake operating mechanism, the grip being removed. Fig. 2 is a longitudinal vertical sectional view of the car, showing in side elevation the attached grip and the grip and brake operating mechanism. Fig. 3 is a detailed view, partly in section, of the apparatus for connecting and disconnecting the grip and the brake operating mechanism. Fig. 4 is a view of apparatus shown in Fig. 3, modified. Fig. 5 is a view partly in side elevation and partly in section of the grip. Fig. 6 is a sectional view upon line $x\,x$ of Fig. 5. Fig. 6^a is an end view, partly in vertical cross-section, of a modified form of clutch. Fig. 7 is a view in longitudinal section of a portion of the lower jaw of the grip. Fig. 8 is a plan view of the pulleys at the curve of the roadway, a portion of one pulley being removed for better illustration. Fig. 9 is a view in vertical section of my improved cable guiding and supporting pulley for curves. Fig. 10 is a plan view of such pulley, parts being broken away for better illustration. Fig. 11 is a view in longitudinal vertical section of a portion of the cable-tube, showing my improved cable-carrying mechanism arranged therein. Fig. 12 is a plan view of my device for automatically throwing the cable from the grip, the signaling device being shown in position in front of the same; and Fig. 13 is a sectional view of a portion of the cable-releasing device illustrated in Fig. 12.

Like letters of reference designate like parts in the several views of the drawings.

To the bottom of the car A are attached the longitudinal beams a, and to these are connected the cross-beams a', provided with suitable journal-bearings to receive the rounded ends of the cross-head B of the grip in order to support the grip in such manner as to permit the same to vibrate laterally, and thus to follow any irregularities in the relation of the track and the tube.

To the cross-head B is securely bolted the side plates B', carrying at their lower ends and at right angles thereto the rigid jaw C of the grip, which jaw is preferably formed integral with the side plates. The bottom of this rigid jaw, as clearly shown in Figs. 5 and 7, is provided with the corrugated or scalloped portions c and the intermediate elevated flat portion, c'. I preferably place above the entire bottom of the lower jaw, upon an elastic strip, c^5, Fig. 7, a supplemental friction plate, c^6, which is made of a shape conforming to that of the bottom of such lower jaw. The function of this supplemental and the subjacent elastic strip

is to afford a more elastic brake-surface and to enable the same to be readily replaced when worn. The side c^2 of the rigid jaw C is furnished with the slots c^3, in which move the outer journals of the rollers D, carrying the endless belt E, which passes also over the idlers e, located at the lower ends of the jaw. The rollers D are serrated or otherwise roughened, as shown, upon the portions of their peripheries which project beyond the sides of the corrugated brake surfaces of the bottom, in order to secure better contact with the endless belt, and are journaled in the side plates d d'. The outer journal-plate, d, is connected by a tongue-and-groove joint in a manner to permit of vertical movement to the end plates of the rigid jaw, and is pressed constantly upward by the flat spring F, held by the bolt f to the lug f' at the bottom of the rigid jaw. The inner journal-plate, d', is connected to the ends of the jaw in a manner similar to plate d, and, like it, is acted upon by a spring, d^2, which is held in the slot d^3 of the jaw. These journal-plates d d', pressed upward, as they are, by the springs F and d^2, serve to keep the rollers D normally elevated above the corrugated brake-surfaces of the jaw-bottom. From the ends of the lower jaw project the lugs c^7, carrying pulleys c^8, which project slightly above the top of the belt E, and serve to support the traveling cable when the grip is not clamped thereto.

Pivotally suspended from the lower gripping-jaw by the pendent lugs c^{10} is a tube-cleaning device, C', (a scraper or brush, the former being shown,) which serves to prevent the accumulation in the tube of any dirt or snow which may fall through the open slot. Springs c^{12} are applied on each side of this cleaning device to hold it in a normally-vertical position, yet allow it to yield, when necessary, in passing over pulleys or other obstacles.

The movable jaw of the grip consists of the box portion G, having a side, g, ends g', and a yoke, G', which fits around the side plates B' of the rigid jaw in such manner as to permit the movable jaw to slide freely up and down thereon. The side g of the box portion G is provided with slots, similarly to the outer side of the lower jaw, and in this box portion are held the rollers D', carrying the endless belt E', the rollers D' being slightly roughened upon their entire surface to prevent the slipping of the belt thereon. These rollers D', like those of the rigid jaw, are journaled in an outer and an inner plate, (designated d^4 and d^5, respectively.) Both of the plates d^4 and d^5 are connected to the ends g' of the box portion G by tongue-and-groove joints, and the outer plate is pressed constantly downward by the spring F', bolted to the lug g^6, while the inner plate is similarly acted upon by the spring F^2. The top or upper side of the box portion G constitutes the brake-surface or mechanism for the belt and rollers of the movable jaw. The upper movable jaw is attached to the plate H, preferably formed integral therewith, which is located between the side plates B', and is provided at its top with the guide-yoke h, which overlaps each side of the plates B', upon which it moves.

To the guide-yoke h is attached, so that it may freely revolve therein, the end of a screw-shaft, I, which passes through a screw-threaded perforation in the cross-beam B, and carries rigidly secured to its upper end the twin connected sprocket-wheels, I'. Around each of these sprocket-wheels passes an endless sprocket-chain, I^2, which extends therefrom to the sprocket-wheel I^3, fixed to the lower portion of the winding-post K on the platform of the car.

From the construction of the grip and its operating mechanism, as above described, it will be seen that when the upper and lower jaws of the grip are a distance apart greater than the diameter of the traveling cable no motion will be communicated thereby to the car; but the cable will move freely over the end pulleys, c^8, on the lower jaw. When, however, by turning the winding-post and the connected sprocket chains and wheels in such direction that the screw-shaft will be forced downward in the screw-threaded perforation of the cross-beam the upper movable jaw will be forced toward the lower rigid jaw, and by this action the cable will be clamped between the two.

My purpose in arranging the belt-carrying rollers upon spring-seated journal-plates, and in providing the same with brake mechanism, as shown, is twofold—namely, to afford a preliminary tractional contact of the belts with the cable, and thus start the car gradually and avoid sudden jerks and strains, and also to enable the rollers to be retarded or stopped without any slip occurring between the belts and the cable. Thus as the movable jaw is caused to approach the cable in the manner above described the belts are first borne against the same, and as the downward pressure continues upon the movable jaw the spring-seated rollers and belt of the lower jaw and the belt of the upper jaw are gradually forced against their respective brake-surfaces, and a slow, easy starting of the car is effected, the speed being increased as desired by exerting greater pressure upon the movable jaw until the movement of the belts and rollers is completely stopped, when the car will have the same speed as the cable.

In Fig. 6^a of the drawings I have shown a modified construction of gripping-jaws, to which a portion of my invention is applicable. In such modification the springs and spring-seated side plates above described are dispensed with, and the rigid jaw C and movable jaw G are provided with oblong slots or journal-bearings c^{10} in their sides, in which fit loosely the journals of the rollers D D'. The rollers D of the lower jaw rest normally upon their friction-surfaces, while the rollers D' of the upper jaw, when the grip is not clamped to the cable, are held by gravity in the ends

of the journal-bearings c^{10} and away from their friction-surfaces. The rollers D D′ are concaved, as shown, in order to form a more effective bearing for the cable, and the brake mechanism is convexed, as shown, to correspond therewith. The outer plates, c^2 and g, are formed separable from the body of the jaws, to which they are attached by screws, and by removing these plates the rollers, when worn, can be readily replaced. With the exceptions stated, the construction of the grips shown in Figs. 6 and 6ª are identical. It is obvious that the form of rollers and brake mechanism shown in Fig. 6ª is equally applicable to the construction of gripping-jaws shown in Fig. 6.

I shall now proceed to describe the mechanism by which the brakes are applied to the wheels of the car when the grip has been released from the cable and the car is to be stopped.

Below the sprocket-wheel I^3, upon the lower portion of the winding-post K, is placed a loose sleeve, K′, provided at its top with a crown-gear, K^2, which is constantly pressed upward and kept normally meshed with the companion crown-gear, K^3, on the bottom of the sprocket-wheel by means of the strong spiral spring K^4, located on the winding-post, and bearing against its flange k and the concaved ring k', upon which rests the curved end of the sleeve K′. In the sleeve K′, below the crown-gear K^2, is formed a circumferential groove or slot, k^2, within which and encircling the sleeve fits the bottom yoke, l, of the treadle L, which passes up through the platform of the car, and is provided midway its top with a yoke, l', encircling the winding-post K.

To the body or central portion of the sleeve K′ is attached the chain m, wound upon the sleeve in such manner that the same movement of the winding-post which clamps the grip will slacken the chain, and a reverse movement of the post will tighten it, and to this chain is joined the rod m', fastened to the lever M, which is pivoted centrally to the post m^2, depending from the bottom of the car. This lever M is connected by the rod m^3 to the brake-beam N, and by the cross-rods m^4 to the companion lever, M′. The lever M′ is centrally pivoted similarly to the lever M, and, like it, also, is connected by a rod, m^5, to a brake-beam, N′, and by the rod m^6 and chain m^7 to the winding-post which is on the platform of the car opposite the winding-post K, already described, and which is provided with like operating mechanism. Each of the winding-posts of the car is furnished with the usual pawl and ratchet, K^5, by means of which, when the grip is clamped upon the cable, it may be retained in such position.

It is apparent from the construction of brake mechanism above described that the crown-gears K^2 and K^3 being normally meshed, and the chain m being wound upon the sleeve K′, as stated, the movement of the winding-post which applies the gripping-jaw to the cable will slacken the chain m and permit the brakes to be lifted from the wheels, while the reverse movement of the winding-post, which releases the gripping-jaws, will tighten the chain m, and so force the brakes against the wheels and stop the car.

When it is desired that the car should move some distance after the grip is released from the cable, either by its acquired momentum, as in crossing an intersecting track or in passing from one cable to another, or by being drawn otherwise than by the cables, it is necessary to disconnect the mechanism which opens the gripping-jaws from that which applies the brakes. This I accomplish by pressing upon the treadle L, connected, as described, to the sleeve K′, so that the crown-gears K^2 and K^3 are separated, and thus the movement of the winding-post which releases the gripping-jaws exerts no action whatever upon the brakes, which remain off the wheels. If desired, a catch of any well-known form may be employed to retain the treadle in its depressed condition.

In Fig. 4 I have shown a modified form of device for connecting and disconnecting the grip and brake actuating mechanism. In such modification the sleeve K′ for the brake-chain is furnished with a conical gear-top, K^6, provided interiorly with vertical ribs or teeth, into which mesh the corresponding teeth upon the surface of the inverted cone-gear K^7, rigidly connected to the sprocket-wheel on the brake-post K. The operation of this modified form of device does not differ materially from that of the device shown in Fig. 3.

From the construction of apparatus as above set out it will be readily seen that the movement of the car can be controlled at will by the winding-post on either platform.

I shall now proceed to describe in detail my improved cable supporting and guiding pulleys for use at the curves or turns of the roadway. These pulleys, as shown in Fig. 8, are of large diameter, and are arranged horizontally upon suitable journals in close proximity and in such manner that the inner peripheries shall be upon a plane, or approximately so, with the slot of the cable-tube. Each of these pulleys consists of a rigid central sheave, O, having collars o attached thereto upon each side. Connected to each of these collars, and extending beyond the same in such manner as to form the space or chamber o', is a side plate o^2, of a diameter approximately that of the rigid central sheave, O. Between the side plates o^2 and the rigid portion O are placed the segmental plates P, constituting the ledges of the pulley. These segmental ledge-plates P are held in position, in a manner susceptible of radial movement, by means of guide-slots p, formed therein, and pins or screws p', passing through the side plates o^2 into the rigid portion O, and are constantly pressed outward by means of the spiral springs p^2, so that their normal position is that illustrated in the drawings. From this construction it will be seen

that by means of the broad segmental ledge-plates P the cable will be held securely upon its sheave without any danger of slipping therefrom, which would not be the case were simple horizontal sheaves alone employed; and as the grip in traversing the curve bears upon the segmental ledge-plates it forces them backward, allowing the central rigid portion to project slightly between the gripping-jaws; but as soon as the grip has passed the ledge-plates return to their normal position and catch the cable before it can sag out of line.

In Fig. 11 I have shown a somewhat modified form of pulley, wherein the ledges are formed of rings Q instead of segmental plates. The operation of the two forms of pulley is, however, substantially the same.

At such points of the roadway as it is desirable that the cable be released from the grip—as, for example, near the terminals or at an intersecting cable railway—I provide the mechanism illustrated in Figs. 12 and 13. This consists of a lever, R, having at its end a yoke, R′, of such size as to permit the cable to pass freely through it, and carrying the vertically-journaled conical roller R^2. To the end of the lever R is pivotally attached the elbow-lever r, fixed in a manner free to turn at r^2, and pivotally connected to r by the link r^3 is the lever r^4. The lever r^4 is pivoted, as shown at r^5, and its outer end projects into the cable-tube in the line of travel of the grip. From this construction it will be seen that as the grip supporting loosely the cable approaches a point where it is necessary to throw the cable from between the jaws the end of the lever r^4 will be forced forward by the grip, and the lever R will be correspondingly retracted into the position indicated by the dotted lines of the drawings. By this action the conical roller R^2 will draw the cable W from the open jaws of the grip.

In order that the engineer may be notified to unclamp the gripping-jaws, so as to permit the cable to be withdrawn therefrom, I place within the cable-tube a signal-gong, S, the hammer S′ of which, acted upon by the spring s^2, is pivoted, as shown, so that its end s projects in the path of travel of the grip. It will thus be seen that before the cable is to be thrown from the grip the signal-gong will be sounded.

Instead of providing the cable-tube with large cable-supporting sheaves or pulleys, as is ordinarily done, I employ a series of small rollers, T, carrying an endless belt, V. These belt-carrying rollers are placed at suitable distances apart in the tube, and afford an even bearing for the cable, less liable to wear than simple sheaves or pulleys, and much more economical, since the endless belts are inexpensive and can be readily replaced when necessary. For undulating road-beds this construction is especially advantageous, as in such case the bearing of an ordinary pulley is too abrupt, a long and even bearing being required. If desired, the rollers at the changes of grade or inclines of the roadway may be set upon an arc, those in the center being higher or lower, as required, than those at the end; or the same object may be attained by making the center rollers of greater or less diameter than the end rollers.

It is obvious that the above-described apparatus may be somewhat modified without departing from the spirit of my invention, and that parts thereof may be separately used. Thus, for example, were the belts omitted from the grip the rollers and brake-surface might still be advantageously employed. I do not wish therefore to be understood as restricting myself to the precise details of structure set out.

I do not claim herein, broadly, the combination, with the gripping device located under the middle portion of the car, of mechanism for operating the same, arranged upon each end of the car. Said invention is reserved by me to form the subject of a separate application. Other parts of the invention hereinbefore described, and not specifically included in the claims to follow, are embodied in another application made by me.

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

1. A cable-grip having a gripping-jaw provided with an endless belt, and with brake mechanism placed in such relation to the belt that the action of clamping the cable will force the belt against the brake mechanism, substantially as described.

2. A cable-grip having a gripping-jaw provided with an endless belt, and with a rigid brake-surface around which the belt passes, and which is adapted to arrest the movement of the belt when the cable is clamped, substantially as described.

3. The combination, with the gripping-jaw, of a cable-grip of the rollers, the endless belt passing over said rollers, and the brake mechanism for acting on said belt, substantially as described.

4. A cable-grip having a gripping-jaw provided with a series of movably-journaled rollers, and an elevated brake-surface, arranged in such relation thereto that the action of clamping the cable will depress said rollers and permit the elevated brake-surface to operate, substantially as described.

5. The combination, with a gripping-jaw, of a series of rollers, journal-plates common to said rollers, springs for acting upon said journal-plates, and brake mechanism, substantially as described.

6. The combination, with a gripping-jaw having a corrugated brake-surface, of the movably-journaled rollers, substantially as described.

7. The combination, with a gripping-jaw having corrugated bottom, of a supplemental friction-plate, substantially as described.

8. The combination, with a gripping-jaw having a corrugated bottom, of a supplemental

friction-plate and an intermediate elastic strip, substantially as described.

9. The combination, with a cable-grip, of rollers the surface of which is roughened, and an endless belt passing over the surface of said rollers, substantially as described.

10. A cable-grip having a gripping-jaw provided with a series of movably-journaled rollers the peripheries of which are partially roughened, and a brake-surface back of said rollers and between the roughened portions, substantially as described.

11. The combination, with a cable-grip, of a tube-cleaning device, substantially as described.

12. The combination, with the cable-grip, of the screw-shaft and beam, the twin sprocket-wheels, the sprocket-chains, and the winding-posts, substantially as described.

13. The combination, with the jaws of the cable-grip, of mechanism for operating the same, mechanism for connecting the grip to the winding-post of the car, mechanism for connecting the winding-post to the brake-beams, and the brake-beams, substantially as described.

14. The combination, with mechanism for operating the cable-grip and the car-brakes, of mechanism for connecting and disconnecting the actuating mechanism of the car-brakes, substantially as described.

15. The combination, with the winding-post K, of the sleeve K′, treadle L, and crown gear-wheels K^2 and K^3, substantially as described.

16. The combination, with the cable-tube, of a series of rollers provided with an endless belt passing over the same for supporting the cable, substantially as described.

17. A cable-supporting pulley for the curves of cable roads, having a rigid portion, and radially-movable ledges adapted to be forced backward by the grip, substantially as described.

18. A cable-supporting pulley for the curves of cable roads, having a rigid central portion and spring-seated side portions, substantially as described.

19. The combination, with the cable-tube, of a gong, and mechanism for sounding said gong, located in the path of the cable-grip, substantially as described.

20. The combination, with the cable, of mechanism located beneath the surface of the road-bed, and adapted to throw the cable from the grip, and a lever for operating said mechanism, located in the path of the grip and adapted to be moved thereby, substantially as described.

21. The combination of the lever R, carrying at its end the yoke R′ and roller R^2, with the lever r^4 and intermediate connecting-levers, substantially as described.

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