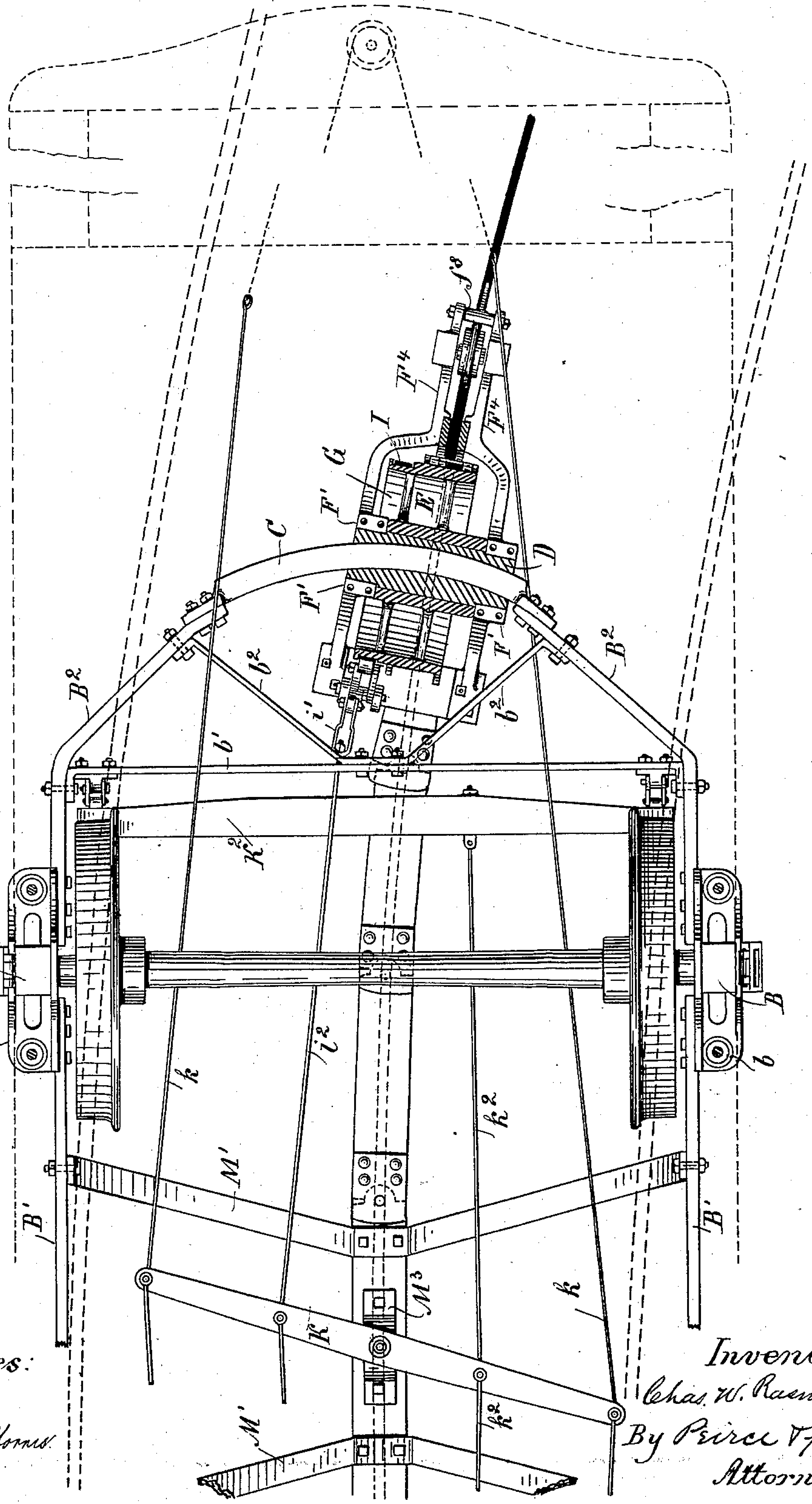
(No Model.) 4 Sheets—Sheet 1.

C. W. RASMUSEN.

CABLE RAILWAY APPARATUS.

No. 290,707. Patented Dec. 25, 1883.

Fig 1.



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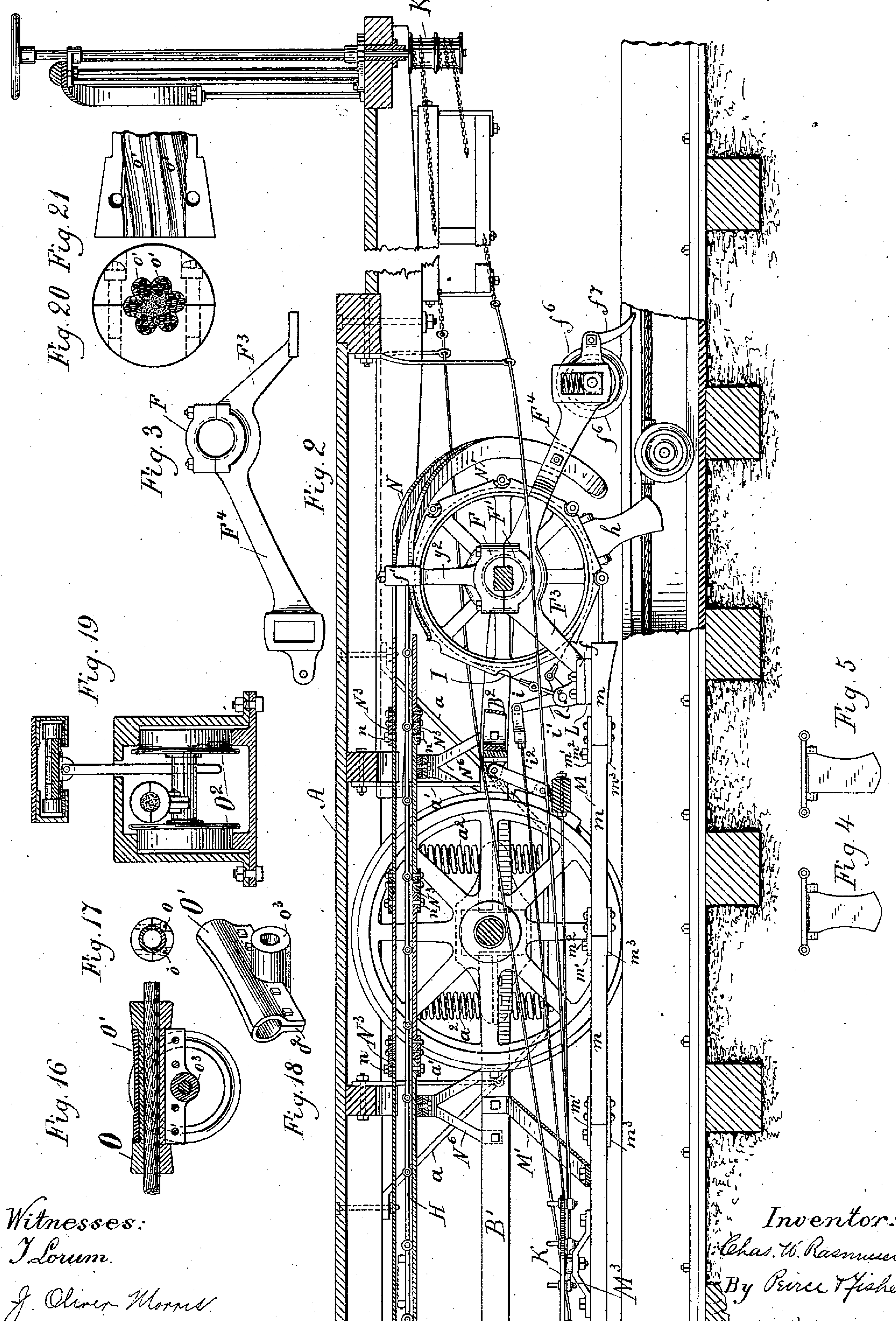

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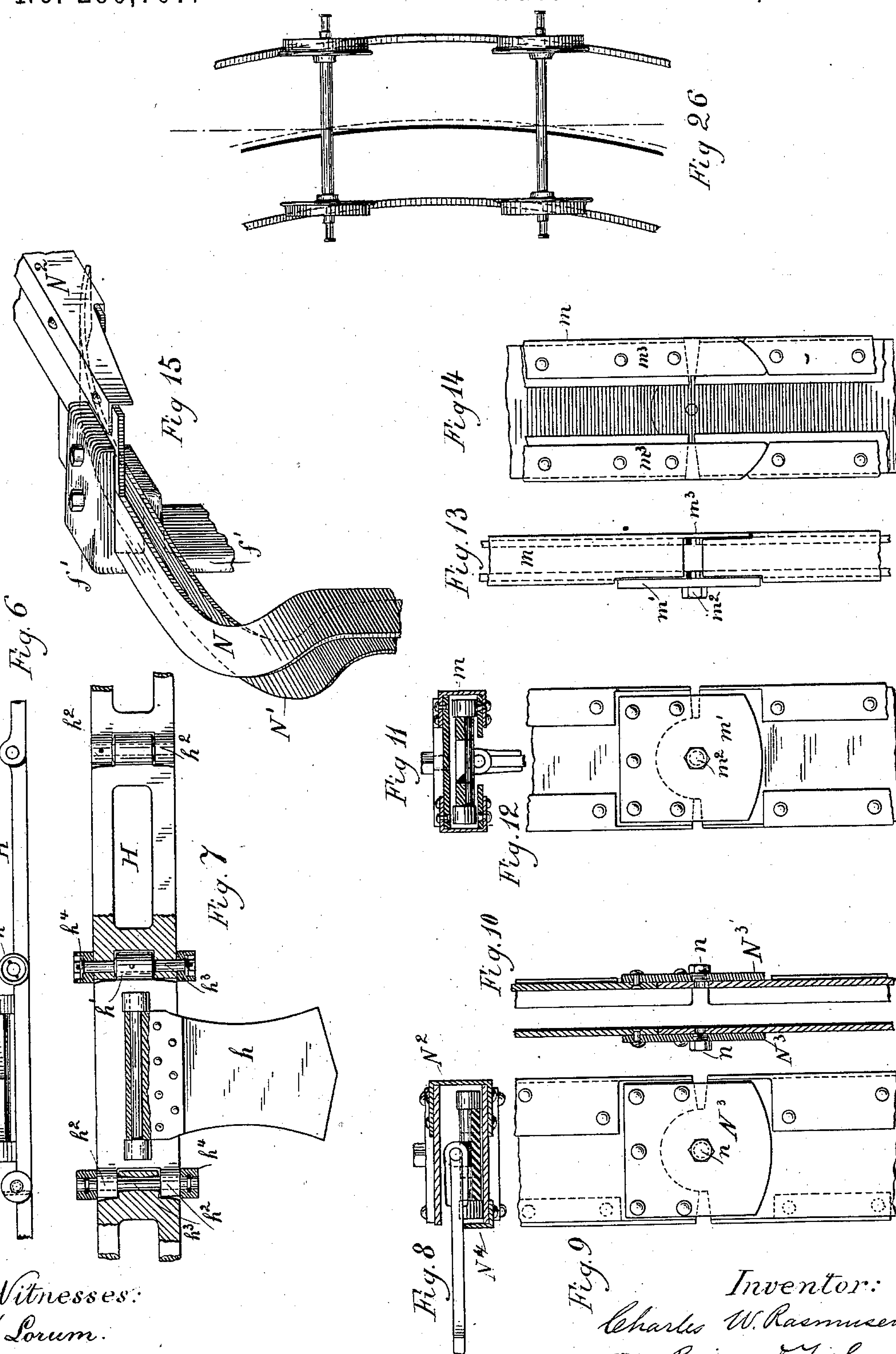

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CABLE RAILWAY APPARATUS.

No. 290,707. Patented Dec. 25, 1883.

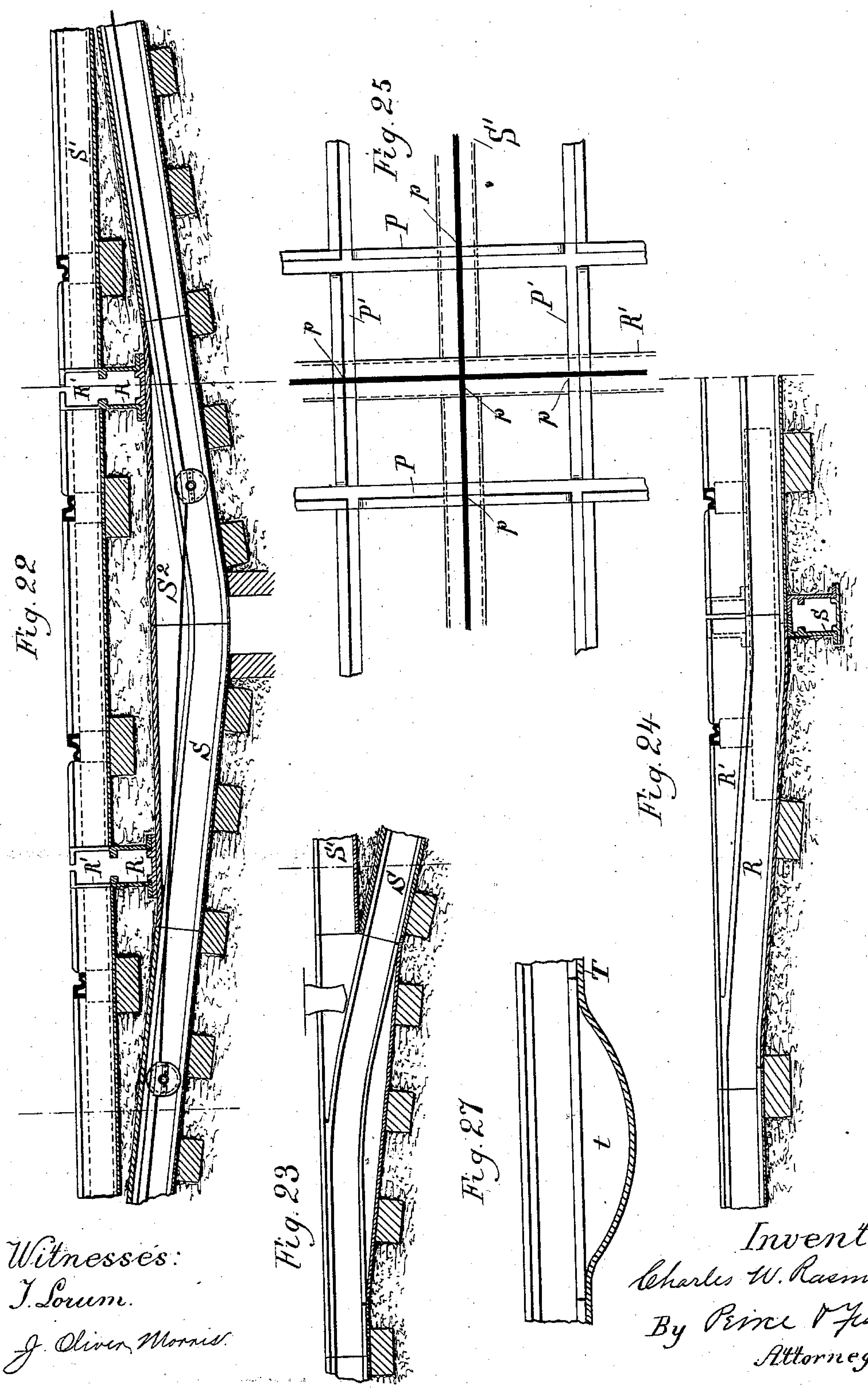

Fig. 22

Fig. 23

Fig. 24

Fig. 25

Fig. 27

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UNITED STATES PATENT OFFICE.

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CABLE-RAILWAY APPARATUS.

SPECIFICATION forming part of Letters Patent No. 290,707, dated December 25, 1883.

Application filed April 23, 1883. (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 full, clear, and exact description.

My present invention has relation to the improvement of cable-railway apparatus, and in particular does it relate to the improvement of apparatus of the character set out in Letters Patent granted to me on the 31st day of October, 1882, and numbered 266,645, and in an application for Letters Patent filed by me on the 29th day of March, 1883. In such former patent and application the attachment of a car to a constantly-moving traction-cable was effected by means of arms projecting from the car and adapted to connect with trucks placed at intervals along the cable. These projecting arms were carried by an endless band or chain supported upon sprocket-drums, the movement of which was controlled by means of friction-clutches operated from the winding-posts at the ends of the car, so that when the drums were locked the endless band was arrested with one of its arms in the slot of the cable-tube in position to be caught by a truck of the moving cable, and when the drums were free to turn the projecting arms were moved freely by the cable-trucks without effecting the propulsion of the car. In the present case the mechanism for connecting the car to the traction-cable is in the main the same as that above referred to; but the endless chain carrying the projecting arms is made laterally flexible, and the guide mechanism and the drums for said chain are made laterally movable, the purposes of such construction being to insure the accurate movement of the projecting arms into and out of the slot of the cable-tube when the car is stopped upon a curve of the roadway. In my present invention, also, the construction of the mechanism for clamping the cable-supporting trucks to the traction-cable is such that the cable will be free to twist without affecting the trucks or causing the truck-wheels to bind upon the rails of the cable-tube.

A further object of this invention is to provide an improved arrangement of tracks and cable-tubes at points where cable-roads intersect, and to so locate the slot of the cable-tube at curves of the roadway as to avoid danger of breaking the arm projecting from the car.

The several objects of my invention I have accomplished by the mechanism hereinafter fully described, illustrated in the accompanying drawings, and particularly defined in the claims at the end of this specification.

Figure 1 is a plan view, partly in section, the car-body and upper guide mechanism being removed. Fig. 2 is a view in vertical longitudinal section, parts being shown in side elevation. Fig. 3 is a detail view, in side elevation, of the castings upon the side of the sliding hub. Figs. 4 and 5 are detail views of the projecting arms for connection with the cable. Fig. 6 is a detail view in side elevation. Fig. 7 is a plan view, partly in section, of the endless chain or band carrying projecting arms. Fig. 8 is a view in transverse section of the upper guide, showing the endless chain thereon. Fig. 9 is a plan view, and Fig. 10 a longitudinal sectional view, of the upper guide. Fig. 11 is a view in transverse section of the lower guide. Fig. 12 is a plan view, Fig. 13 a side view, and Fig. 14 a bottom view, of the lower guide. Fig. 15 is a detail perspective view of a portion of the upper guide and its forward extensions. Fig. 16 is a view in longitudinal section of the mechanism for clamping the trucks to the cable. Fig. 17 is a detail view of the clamping-sleeve in transverse section. Fig. 18 is a perspective view of the clamp. Fig. 19 is a view in transverse section of the cable-tube and lower guide, showing the truck and arm in elevation. Fig. 20 is a front view of the clamping-sleeve. Fig. 21 is a detail view, showing the inner surface of the clamping-sleeve. Fig. 22 is a central vertical section, showing the arrangement of the cable-tubes at intersecting roads. Figs. 23 and 24 are detail views in vertical section, showing the connection of the main and supplemental cable-tubes. Fig. 25 is a plan view of tracks and tubes of intersecting roads. Fig. 26 is a plan view, showing the position of the car upon a curve of the roadway. Fig. 27 is a detail view, showing a cable-tube having dirt-discharge opening in the side thereof.

In the accompanying drawings, A designates the body of the cable-car, from which depends the hangers a, braced by the rods a', and perforated at their bottoms to receive the rods, around which fit the spiral springs a^2, by which the car-body is sustained, and which rest upon the flanges b of the journal-box frames B. To these journal-box frames are bolted the side bars, B', that extend between the journal-boxes on each side of the car, and also the extension-bars B^2, which are curved inwardly, as shown in Fig. 1, and are braced by the cross-rod b' and the side stays, b^2, suitably bolted thereto. The front ends of these extension-bars are connected together by the square, curved glide-bar C, around which is fitted in a manner free to slide laterally thereon the sleeve or hub D, that carries the drum E, over which passes the endless chain carrying the projecting arms, by which the car is connected with the traction-cable. The hub D is preferably formed of two half-sections somewhat reduced at their ends, around which are bolted, as shown in Figs. 1 and 2, the castings F and F', that have formed integral therewith, respectively, the arms F^3 F^4.

Upon the central portion of the hub D, between the castings F and F', is held the sprocket-drum E, the construction of which may be similar to that described in my patent above referred to. This drum has a portion for the passage of the endless chain H, provided with the projecting arms h, hinged thereto, as shown, and a portion, G, constituting the friction-hub, over which passes the friction-strap I, one end of which is connected to the link i, and the action of which is controlled by means of the elbow-lever i', the rod i^2, the main lever K, the rods k, and the winding-post K', in the manner fully set forth in my above-mentioned patent and prior application.

The flanged ends f of the arms F^3 are bolted to the plate L, upon which rests the standard l, that supports the elbow-lever i', and by this plate is also sustained the end of the lower guide, M, which is slotted upon its under side, as shown in Figs. 11 and 19, to permit the passage of the projecting arms of the endless chain. The outer portions of this lower guide are formed of the tubular sections m, the ends of which are suitably cut to form a concavo-convex joint, and are connected together by means of the top plate, m', which is riveted, as shown, to one section, and is pivotally connected by the bolt m^2 to the adjoining section. To the under side of the ends of the tubular sections m, and upon each side of the slot, at a slight distance therefrom, are attached the plates m^3, riveted to the end of one section, and resting beneath and supporting the end of the adjoining section. To the central section of the lower guide, M, is connected the sustaining-rod M', which is bolted to the side bars, B', of the main sustaining-frame. Upon this central section is held the bracket M^3, to which is pivotally connected the main lever K, which, as in my former patent, serves, by means of the rods k^2 to operate brake-beams K^2, and by means of the rod i^2, to control the friction-clutch, and is itself operated by the rods and chains extending to the winding-posts at the ends of the car.

To the bracket-shaped ends f' of the casting F is connected, as shown in the detail view, Fig. 15, the rear ends of the front curved guide, the top plate, N, of which is formed integral with the top plate of the main upper guide, while the bottom plate, N', terminates at a short distance beyond the drum E. The plates N and N' are curved downwardly and inwardly to a point near the cable-tube, and are connected near their lower ends to the guide-arms F^4, which extend from each side of the castings F', and are curved to carry the spring-seated guide-wheel f^6 and the guide-blade f^7. The blade f^7 enters the slot of the cable-tube, and is especially advantageous in clearing the slot from dirt or snow and in opening any switches in the road. As shown in Fig. 1, the blade f^7 is carried by its hub f^8, bolted to the ends of the guide-arms F^4. The top and bottom plates, N and N', of the upper guide are formed of sectional plates, connected together on one side by the bent plates N^2, Fig. 15, and the abutting ends of these top and bottom plates are cut to form the concavo-convex joint, and are held together by means of the hinge-plates N^3, bolted to the top and bottom plates of one section, and pivotally connected by bolts n to the plates of the adjoining section. By this construction, as will be seen, a lateral movement of the upper guide can be had.

To one edge of the bottom plate, N', is bolted the angle-plate N^4, to prevent displacement of the endless chain, and above this angle-plate is left the space for the passage of the projecting arms as they travel through the guide. The upper guide is sustained from the main supporting-frame by means of the braces N^6 bolted to the bottom plate, N', and to the side bars, B', and the extension-bars B^2.

The endless chain or band H, that passes through the upper and lower guides and over the sprocket-drums at each end of the car, consists, preferably, of flat links, the ends of which are joined together in such manner as to permit lateral flexure of the chain. In the hinge-joint shown in detail, Fig. 7, the knuckles h' and h^2 are respectively convex and concave, and the perforations through the knuckles h' are enlarged to permit them to turn slightly in lateral direction upon the pins h^3, which pass through the knuckles h^2, and carry the friction-rollers h^4 keyed thereto.

From the foregoing description it will be seen that the sprocket drum or pulley that carries the endless chain will be moved to one side as the car traverses the curve by the guide-blade and wheel that follow the curve of the slot in the cable-tube, and are connected to the drum. At the same time the upper and lower laterally-flexible guides will be bent, as will also the endless chain passing through these guides and over the drum.

The operation of the friction-clutch to control the starting and stopping of the car is the same as that set out in my former patent.

It is apparent that the car can be readily stopped upon a curve, as the above-described arrangement of laterally-movable guides, drums, and chain insure the accurate movement of the projecting arms h into and from the slot of the cable-tube. It will be noticed that the edges of the projecting arms h are concaved, the purpose of this being to enable them to connect more securely with the cable-trucks, and the ends of these arms are rounded or pointed, so as to avoid all danger—as, for example, when the car is passing onto a curve—of the trucks striking the ends of the arms, and thus cause breakage of parts or displacement of the car.

In Figs. 16 to 21 of the drawings is illustrated the improved construction of clamp mechanism for attaching the trucks to the traction-cable. The sleeve O, formed preferably of sections bolted together, as at o, has its interior surface provided with spiral ridges o', adapted to fit within the spaces on the surface of the cable between the separate strands or ropes, and thus retain the sleeve more securely in place. The central portion of the periphery of this sleeve is recessed, as shown, and within this recess fits loosely enough to turn the clamp O′, formed of two sections held securely together by means of the bolts passing through the flanges o^2. One of these flanges carries the sleeve o^3, through which passes the axle of the truck-wheels O^2. From this construction it will be seen that, the cable being free to turn within the clamp, any twisting of the cable cannot affect the trucks or cause the wheels to bind upon the rails.

When the car is traversing a curve, the center of the car is not at a point exactly above the center of the track, as is shown by Fig. 26 of the drawings. In traversing a curve the arm connecting the car with the traction-cable is located below the car center, and to avoid strain upon such arm I have arranged the slot of the cable-tube, at curves of the roadway, at a slight distance out of center line and nearer the inner rail, so that the slot shall always be exactly beneath the projecting arm as the car traverses the curve.

In order to permit cable-railways running in different directions to cross each other, I have provided the improved arrangement of cable-tubes illustrated in Figs 22 to 25 of the drawings. In these figures, P designates the track of a road, and P′ the track of the intersecting road, both these tracks being laid in the usual manner, and being slotted at p to permit the passage of the arm projecting from the car. The main cable-tubes R and S of the tracks are depressed, and above these tubes, and upon a level with the road-bed, are placed the supplemental or false tubes R′ and S′, having slots, through which the arm projecting from the car may pass until it again enters the main cable-tube and is caught by a truck. The supplemental tube R′ rests upon and is bolted to the main tube R, which is but slightly depressed, and this supplemental tube is slotted, as at r, to allow the passage of the projecting arm of the car traversing the cross-track. The supplemental tubes R′ and S′ are joined to the main tubes R and S at the beginning of their depressions, as shown in Figs. 23 and 24, so that as a projecting arm leaves the main tube it will enter the slot of the supplemental tube, and be guided thereby. The main tube S′, at the lowest part of its depression, is slotted in the top and provided with the enlargement S^2, the purpose of this construction being to allow free movement of the cable, as seen in Fig. 22, without danger of friction against the top of the tube. By this improved arrangement of cable-tubes the cars can cross intersecting tracks without the necessity of turning to one side the projecting arm, as described in my former patent.

In Fig. 27 is illustrated an improved arrangement of dirt-discharge opening for the cable-tubes. The bottom plate, T, of the tube is depressed, as shown, in such manner as to form the passages t in the side of the tube leading to suitable discharge-conduit. I prefer to thus form the discharge-opening in the side of the tube, instead of in the bottom, in order to avoid any danger of breaking the trucks by inserting any object—as, for example, a metal bar—through the slot of the tube and into the discharge-opening, which would be possible were such opening in the bottom.

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

1. In a cable-railway car, the combination, with an endless chain or band carrying projecting arms for connection with the cable, of a laterally-movable drum for supporting said chain or band, substantially as described.

2. The combination, in a cable-railway car, of an endless chain or band carrying projecting arms for connection with the cable, drums or pulleys for carrying said chain or band, and a frame for supporting said drums or pulleys, and on which they are mounted in a manner permitting lateral movement, substantially as described.

3. In a cable-railway car, the combination, with the journal-box frames, of the front extensions, B^2, the glide-bar, and the drum movably supported upon said glide-bar, substantially as described.

4. In a cable-railway car, the combination, with the forward extensions, B^2, of the glide-bar, the hub mounted on said glide-bar, the drum for supporting the chain carrying projecting arms, the castings F and F′, the arms F^4, and the guide-roller, substantially as described.

5. In a cable-railway car, the combination, with the projecting arms for connection with the cable, of a laterally-flexible chain or band for supporting said arms, substantially as described.

6. In a cable-railway car, the combination,

with projecting arms, of the chain or band, consisting of flat links connected together by laterally-flexible joints, substantially as described.

7. In a cable-railway car, the combination, with the endless chain or band, of projecting arms having inclined ends, substantially as described.

8. In a cable-railway car, the combination, with the endless chain or band, of projecting arms having concaved faces, substantially as described.

9. In a cable-railway car, the combination, with the chain or band carrying projecting arms, of laterally-flexible guide mechanism for said chain or band, substantially as described.

10. In a cable-railway car, the combination, with the laterally-flexible band or chain and the laterally-movable drum, of the upper guide connected to said drum and formed of sections joined together, substantially as described.

11. In a cable-railway car, the combination, with the laterally-flexible band or chain carrying projecting arms, of the upper guide therefor, formed of sections having top and bottom plates connected together at one side and hinged together at their ends, substantially as described.

12. In a cable-railway car, the combination, with the laterally-flexible band or chain carrying projecting arms, of the lower guide, formed of sections hinged together, and the laterally-movable drum, with which said lower guide is connected, substantially as described.

13. In a cable-railway car, the combination, with the laterally-flexible chain or band carrying projecting arms, of the laterally-flexible guide mechanism and the laterally-movable drums or pulleys for supporting the chain or band, substantially as described.

14. In a cable-railway car, the combination, with the laterally-movable drum, of the guide-roller adapted to enter the slot of the cable-tube, and means for connecting the roller to the movable drum, substantially as described.

15. In a cable-railway car, the combination, with the guide-arms, of the guide-blade adapted to enter the slot of the cable-tube, substantially as described.

16. The clamping mechanism for attaching stops or trucks to a traction-cable, having a portion fixed securely upon the cable, and having a portion adapted to carry the stop or truck held in a manner free to turn, substantially as described.

17. In cable-railway apparatus, the combination, with a traction-cable, of the sleeve having recessed central portion, the clamp held loosely upon said central portion, and the stop or truck for supporting the cable, substantially as described.

18. In cable-railway apparatus, the combination, with the curved rails, of the slotted cable-tube located between the rails and slightly nearer the inner rail of the curve, substantially as described.

19. In cable-railway apparatus, the combination, with intersecting tracks, of the intersecting cable-tubes, both of which are depressed, substantially as described.

20. In cable-railway apparatus, the combination, with the intersecting tracks, of the intersecting cable-tubes, both of which are depressed, and supplemental tubes upon the level of the road-bed, substantially as described.

21. In cable-railway apparatus, the combination, with the track, of a curved cable-tube having an enlarged portion for the passage of the cable without interference with the tube, substantially as described.

22. A tube for traction-cables, having a dirt-discharge opening in its side, substantially as described.

23. A tube for traction-cables, having a depressed bottom, and having a dirt-discharge opening in its side, substantially as described.

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