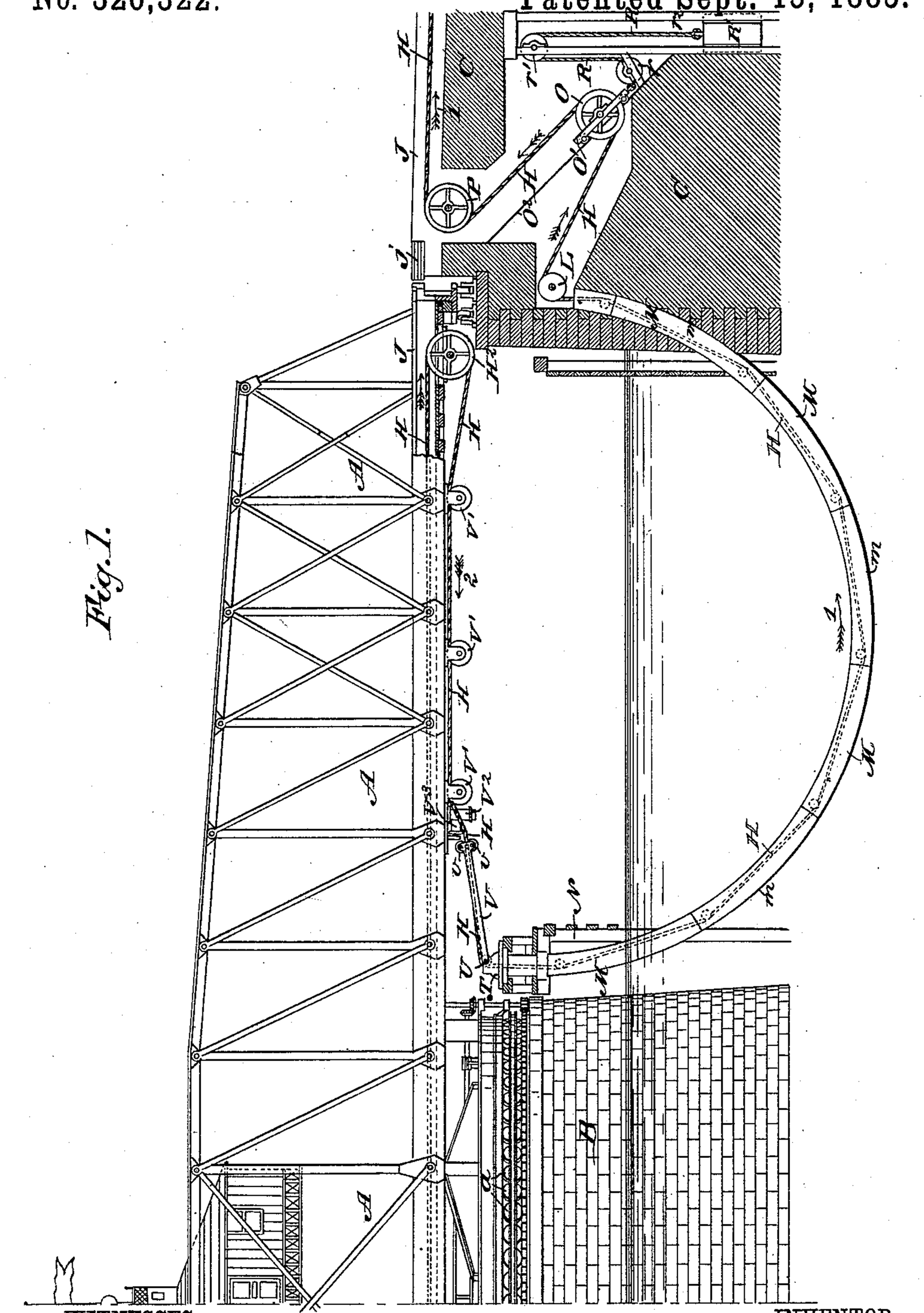
(No Model.) 3 Sheets—Sheet 1.

J. G. OGDEN.

RAILWAY CABLE BRIDGE SYSTEM.

No. 326,322. Patented Sept. 15, 1885.

Fig. 1.



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(No Model.) 3 Sheets—Sheet 2.

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RAILWAY CABLE BRIDGE SYSTEM.

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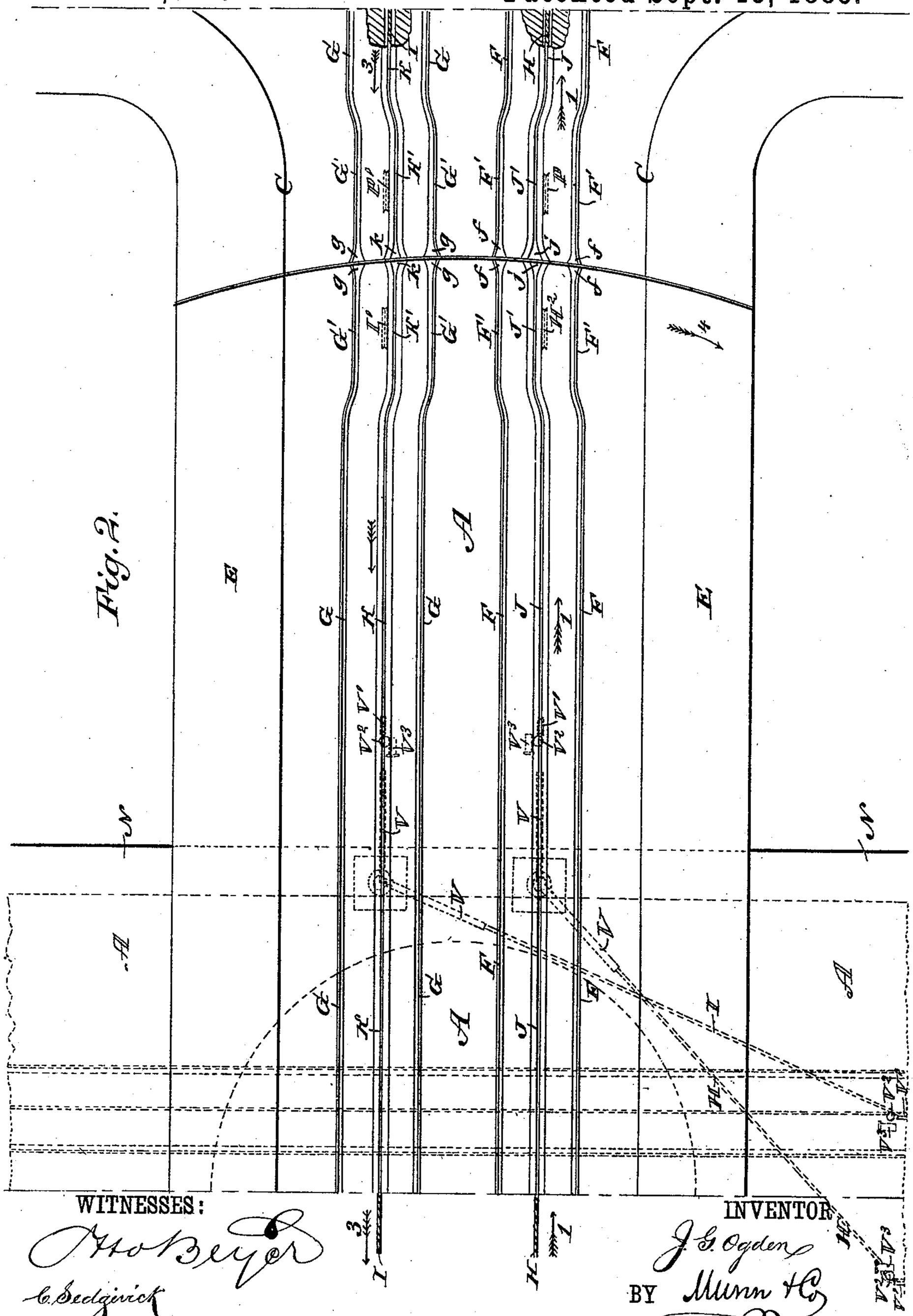
Fig. 2.



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(No Model.) 3 Sheets—Sheet 3.

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RAILWAY CABLE BRIDGE SYSTEM.

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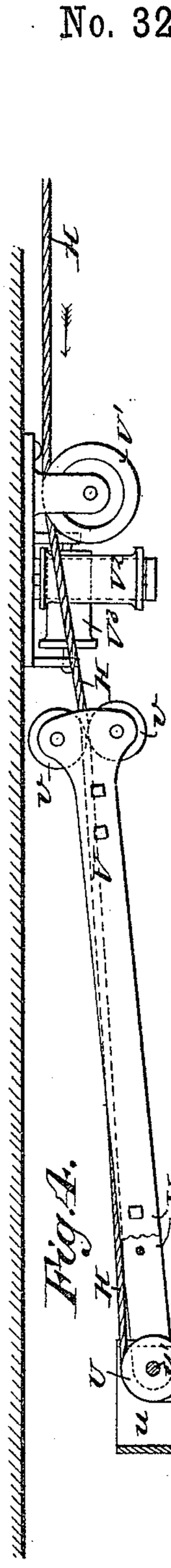

Fig. 4.

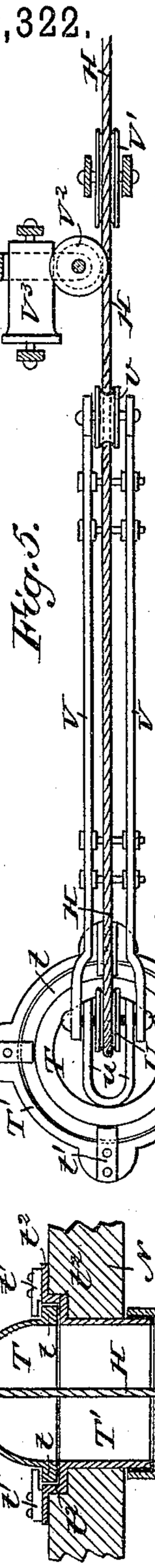

Fig. 5.

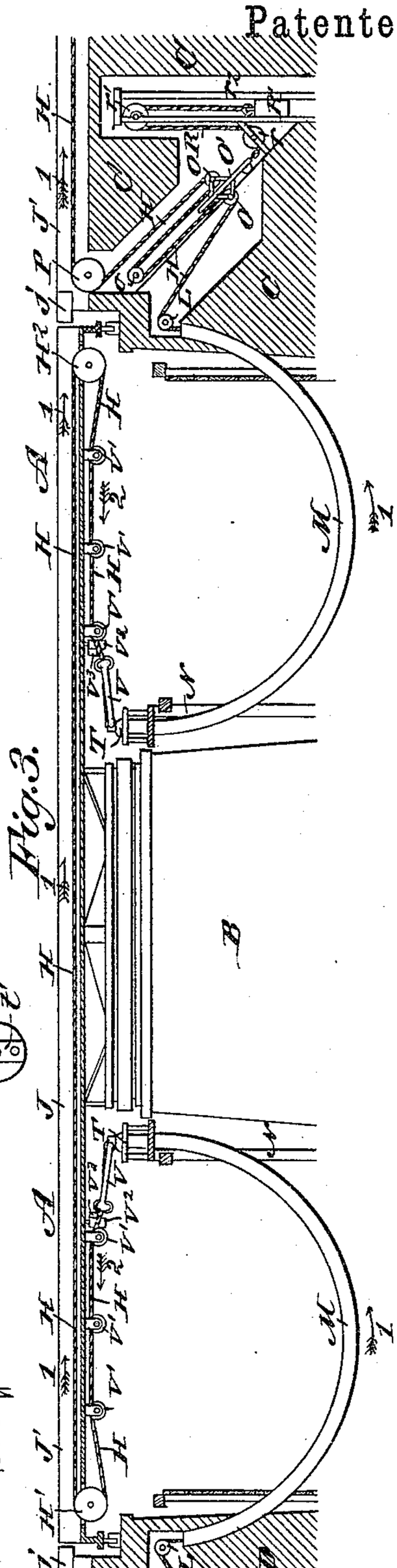

Fig. 3.

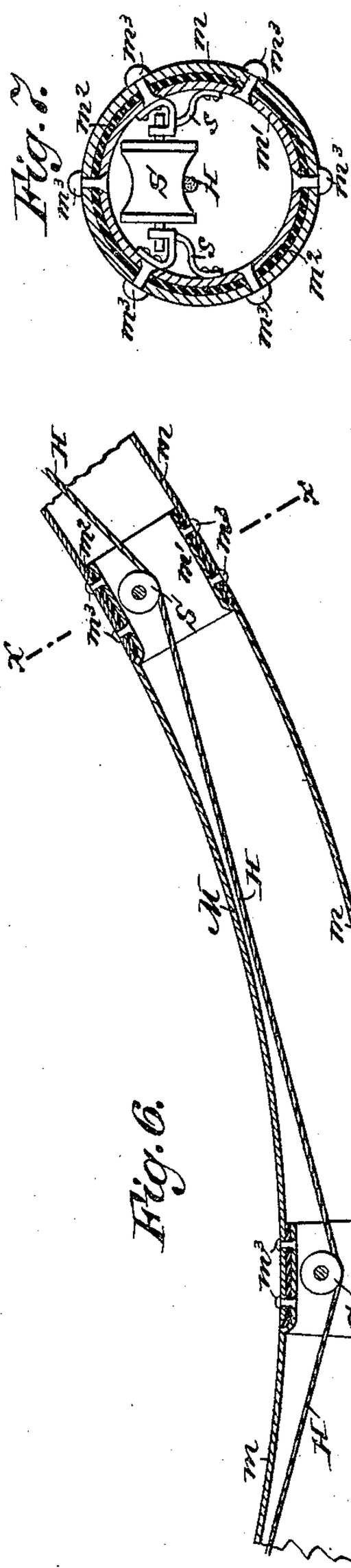

Fig. 6.

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UNITED STATES PATENT OFFICE

JOHN GILBERT OGDEN, OF CHICAGO, ILLINOIS.

RAILWAY-CABLE-BRIDGE SYSTEM.

SPECIFICATION forming part of Letters Patent No. 326,322, dated September 15, 1885.

Application filed April 21, 1885. (No model.)

To all whom it may concern:

Be it known that I, JOHN GILBERT OGDEN, of Chicago, in the county of Cook and State of Illinois, have invented a new and Improved Cable-Railway-Bridge System, of which the following is a full, clear, and exact description.

My invention relates to a cable-railway-bridge system wherein a continuously-running cable passes over the draw, whether it be open or closed, and while it is being opened and closed, and continues along the route from both ends of the draw, so that cars or vehicles provided with cable-gripping devices may be moved to and over the draw by the cable.

The invention consists in a cable-railway-bridge system comprising devices for taking up slackness in the cable as the draw is closing; also, means for conducting the running cable across the water-course spanned by the draw, and means for guiding the cable onto the draw-sheaves over which the cable travels.

The invention includes, also, various novel constructions and combinations of parts of the cable-railway-bridge system, all as hereinafter fully described and claimed.

Reference is to be had to the accompanying drawings, forming part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 is a partly sectional side elevation, showing one-half of a draw-bridge and its center pier and one of the abutments. Fig. 2 is a plan view thereof, showing the draw open in dotted lines. Fig. 3 is a longitudinal sectional elevation or diagram, showing the entire bridge-floor and both abutments, and with a modified arrangement of the devices for taking up the slack of the cable as the draw closes. Fig. 4 is an enlarged sectional side elevation of one of the cable-leading-arms and adjacent cable pipe and guides. Fig. 5 is a plan view thereof. Fig. 6 is an enlarged longitudinal sectional elevation of part of one of the submerged cable-pipes; and Fig. 7 is an enlarged cross-sectional elevation taken on the line *x x*, Fig. 6.

The letter A indicates the draw, in this case comprising the whole bridge, which is mounted to turn horizontally on rollers *a*, running on tracks on the center pier, B; and C D are, respectively, the opposite abutments.

As shown, the bridge has paths or walks E for pedestrians at each side of its central portion, on which are laid the double tracks F G for the passage in opposite directions of the cars or vehicles, (not shown,) which are propelled by the going and returning cables H I, respectively, the cars having any approved gripping devices attached to arms fixed to them, said arms passing through guide-slots J K between the track-rails F F and G G, respectively, (see Fig. 2,) so as to permit gripping of the cables H I. The guide-slots J K are directly above the cables except for a short distance each way from the opposite ends of the draw, to allow the gripping arms and devices to clear the cable guide pulleys or sheaves on the ends of the draw and abutments, as hereinafter more fully explained.

The letters F′ and G′ represent the offset portions of the going and returning tracks F G, and the letters J′ K′ indicate the corresponding offset portions of the grip guideways J K.

At each end of the draw the tracks F G have laterally and outwardly bent or inclined end parts, *f g*, on the draw and abutment, and the central guideways, J K, also have end parts, *j k*, diverging laterally toward the joints of the draw with the abutment, so that the cars will keep the tracks and the grips of the cars will enter the guides from either direction should the ends of the draw be slightly turned to one side or the other when the draw is closed.

The cables H I are arranged alike at opposite sides and ends of the draw with reference to their respective car-tracks, F G, and their supports and guides and slack-take-up devices, presently described.

At each of the abutments C D the take-up devices are arranged for each of the cables H I, and said devices may consist of a pulley or sheave, L, over which the cable passes from a submerged pipe, M, which sweeps across the water-course or drawway at each side of the center pier, B, or its protection N to the opposite abutment, C or D, and from sheave L, as in Fig. 1, the cable, as at H, passes under a

wheel, O, journaled to a carriage, O′, which slides or runs on inclined ways, O², and thence the cable passes upward over a sheave, P, and thence along the streets or route selected for it.

To insure the descent of the carriage O′ and wheel O to carry down the bight of the cable, I will connect to carriage O′ the cable or rope R, which passes under a sheave, *r*, thence upward over a sheave, *r′*, whence it hangs and has connected to it a weight, R′, fitted in suitable slideways, *r*², supported in the abutment.

Should the length of the draw, and consequently its extent of opening, be considerable, a simple bight of the cable in the take-up apparatus might compel too great travel of the bight-sheaves and connected weights. Hence in this case it will be desirable to use the compound take-up apparatus represented at both piers C D in Fig. 3, wherein the carriage O′ is fitted with two wheels, O O, hanging each in a separate bight of the cable, an intermediate guide-sheave, *o*, being journaled in the abutment for the slack cable to run over to the bight-wheels. It will be seen that with this construction the weight R′ will move but one-half the distance of the weight shown in Fig. 1, and by providing three or more bights in the slack cable the fall of the take-up weight and bight-wheel carriage will still further be lessened; but to avoid excessive friction the slack cable will have the least practicable number of bights and guide-pulleys therefor at the abutments.

There will be two of the cable guide-pipes M between each of the abutments and the center pier to allow each cable H I to pass from the center pier to both abutments, and the pipes will be submerged sufficiently to allow vessels to pass the draw-bridge, and preferably will be supported on the river bed.

I make the pipe M in sections or lengths *m*, having a contraction or neck-flange, *m′*, at one end fitting loosely into the end of the next pipe-section, *m*, so that the joints of the sections may be calked, as at *m*², from the inside of the pipe at any time, as required to maintain water-tight joints. The lapped joints of the pipe are fastened by bolts *m*³, shown clearly in Figs. 6 and 7.

Within the pipes M are journaled guide sheaves or rollers S for the respective cables H I to pass under on their way through the pipes, the journals of said rollers having bearings in brackets *s s*, fastened to the neck-flanges *m′* of the pipe-sections.

The upper ends of the four pipes M, which rise through the center-pier protection N have fitted at their tops the horizontally-rotating turn-tables or heads T, which, as shown, have lower flanges, *t*, held to their bearings by blocks *t′*, secured, it may be, to the protection N, so as to overlap the flanges. I prefer to fit the heads T into short pipe sections or caps T′, having annularly-recessed flanges *t*², in which the heads are fitted and to which the retaining-blocks *t′* are fastened, said flanges *t*² being bolted strongly to the pier-protection N, and so that the heads of the pipes M may be connected to the caps T′, as shown in Figs. 4 and 5.

The upper part of each head T is contracted to form parallel plates or cheek-pieces *u u*, between which, on a pin or bolt, *u′*, passed through the plates *u u*, is journaled a sheave or roller, U, over which the cable H or I passes as it leaves or enters the pipe M, and on the pin *u′* is also pivoted the arm V, which carries a pair of guide rollers or sheaves, *v v*, at its outer end, the cable passing from sheave U between sheaves *v v*, and thence to the first cable-guide sheave or roller, V′, journaled to hangers fixed to the draw.

A pair of long rollers, V² V³, flanged at the ends in spool form, are journaled in suitable hangers fixed to the draw, the roller V² ranging vertically and the one V³ ranging horizontally just back of and as close as may be to roller V², so that as the draw A is turned the rollers will keep the cables H or I on their respective sheaves next the ends of arms V as the arms swing around either way with the heads T when the draw opens or closes.

There will be as many sheaves V′ hung from the draw as may be required to support the cables H I, and at opposite ends of the draw are journaled sheaves or rollers H′ H², at one side of the draw, over which the cable H runs, and like sheaves or rollers are journaled at their opposite side, over which sheaves the cable I runs.

The complete general arrangement and operation of the cables is as follows: Referring to Fig. 3, we will suppose the "going" cable H to be advancing from the street or route back of abutment D toward said abutment in direction of arrow 1, the draw A being closed. The cable H will first pass over the sheave P; thence around the slack-take-up devices, consisting of one or more wheels, O, resting in the bight or bights of the cable, as above described, and thence over the sheave L, and around through the first submerged pipe, M, to the center pier; thence over the sheave U and along the first arm, V, and between its end sheaves, *v v;* thence to and over the sheaves V′ in direction of arrow 2 to the end sheave, H′, on the draw, over which it passes, and thence along the draw in direction of arrows 1 to and around the sheave H² at the opposite end of the draw, and thence over sheaves V′ in direction of arrow 2 to the second arm, V, and between its end sheaves, *v v*, and over its sheave U down into and around through the second pipe M; thence over the second sheave L and through the slack-take-up wheels or devices to and over the sheave P on abutment C, and thence along the street or road to the return-wheels at the end of the route, after passing which it becomes the returning cable

I, which passes over sheave P', Fig. 2; thence through slack-take-up devices in abutment C, and through the third pipe M, and over a pulley, U, and third arm V back along sheaves V' to the end sheaves I', Fig. 2; thence along the draw in direction of arrow 3, Fig. 2, to its opposite end, where it passes under an end sheave like the one I', but situated directly opposite the sheave H', and thence backward along sheave V' to the fourth arm V at the center pier and between its end sheaves, *v v*, and over its sheave U, and thence through the fourth pipe M, and over a sheave, L, to the fourth and last set of slack-take-up devices O in the abutment D, and over a guide-sheave (not shown) opposite the first sheave P, and on along the land-tracks to the end of the route or to the power-transmitting machinery by which the continuous cable is driven.

When the draw A is opened—say in the direction of arrow 4 to the position shown in dotted lines in Fig. 2—the arms V will swing from positions parallel to the guideways to positions in a direct line between their respective turn-tables or supports T and the guide-rollers V^2 V^3 and adjacent sheaves V', and as the draw turns the slack cable at each side of the abutments C D will pay out, the carriage O' then being drawn upward and the weights R' lifted more or less, and after the vessel has passed and while the draw is being closed the slack of the cables will be taken up at the abutments by the carriages O' and their wheels, aided by the weights R', so that an even tension of the cable will be maintained whether the draw be open or closed, and while it is being opened or closed.

As the draw is closing the arms V will gradually swing around, to come into line again with the guideways J K of the draw.

As the cars propelled by the cable approach the abutments at either end of the draw, the gripping devices of the cars will be released from the cable as they reach the offset parts J' K' of the guides J K, and the cars will switch by their momentum to the offset parts F' G' of the tracks F G, so that the gripping devices will pass by the adjacent cable-sheaves at each side of the joint of the draw with the abutments; and when the offset parts of the guides and tracks have been passed the cars will pass upon the main straight tracks, and the gripping devices will then come in line with the cable, which may be gripped again to move the car forward by the cable.

As the cable runs continuously, even when the draw-bridge is open, the cars may be moved along to the draw at any time.

I have shown and particularly described my improved system of endless cables as applied to a draw swinging open horizontally on a center pier built in mid-stream; but the cable-slack take-up devices may be applied to draws which open by a vertical movement, or to draws which swing open either upward or sidewise from one end, the slack cable paying out as the draw would open, and the slack being taken up by the weighted bight wheels or sheaves as the draw is brought to its normal level or position, substantially as above described.

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

1. In a cable-railway-bridge system, the combination, with a draw, of a cable guided along the draw and beneath the drawway and slack-take-up devices for the cable next the end or ends of the draw, substantially as herein set forth.

2. In a cable-railway-bridge system, the combination, with a draw, of a cable extending along the draw, a conduit ranging beneath the drawway through which the cable passes, guides for the cable between the end of the draw and one end of the conduit, and slack-take-up devices for the cable, substantially as herein set forth.

3. In a cable-railway-bridge system, the combination, with a draw, of a cable extending along the draw, a pipe or conduit ranging beneath the drawway, and guides for the cable between the end of the draw and one end of the conduit, consisting of sheaves on the draw and a swinging arm pivoted to the cable-conduit, and slack-take-up devices for the cable, substantially as herein set forth.

4. In a cable-railway-bridge system, the combination, with a draw, of a cable extending along the draw, a conduit beneath the drawway, a turn-table pivoted on one end of the conduit, a swinging arm carrying sheaves held on the turn-table, guides for the cable between the end of the draw and the end of the swinging arm, and a slack-take-up device for the cable, substantially as herein set forth.

5. In a cable-railway-bridge system, the combination, with a draw, of a cable extending along it and through a pipe or conduit ranging beneath the drawway, guides for the cable arranged between the end of the draw and one end of the conduit, and slack-take-up devices consisting of one or more bight-wheels fitted to slide next the end of the draw, substantially as herein described.

6. In a cable-railway-bridge system, the combination, with a draw, of a cable extending along it and through a pipe or conduit ranging beneath the drawway, guides for the cable arranged between the end of the draw and one end of the conduit, and consisting of sheaves on the draw and a swinging arm carrying sheaves hung to a turn-table pivoted to the top of the cable pipe or conduit, and slack-take-up devices consisting of one or more bight-wheels fitted to slide next the end of the draw, substantially as herein set forth.

7. In a cable-railway-bridge system, the combination of the draw A, the endless cable H I, cable-slack take-up devices, substantially as specified, the submerged pipes M, and sheaves or rollers S, fitted in pipes M, as herein set forth.

8. In a cable-railway-bridge system, the com-

bination of the draw A, the endless cable H I, cable-slack take-up devices, substantially as specified, operating at the bridge-abutments, pipes M, swinging arms V, end guide-sheaves, V′, and the guide-rollers V^2 V^3, substantially as herein set forth.

9. In a cable-railway bridge system, the combination, with the draw, its abutment, the endless cable, and the cable guide pipes M, of cable-slack take-up devices consisting of one or more bight-wheels, O, mounted in a carriage fitted to slide in the abutment, substantially as herein set forth.

10. In a cable-railway-draw-bridge system, the combination, with the draw, the endless cable, and the pipes M, of slack-take-up devices consisting of one or more bight-wheels, O, mounted in a sliding carriage and weighted, as at R R′, substantially as herein set forth.

11. In a cable-railway-bridge system, a cable guide-pipe, M, crossing the drawway, constructed with connected necks *m′* at one end of its sections, allowing the joined sections to be calked from the inside, substantially as herein set forth.

12. In a cable-railway-bridge system, the combination, with the cable guide-pipe M and swinging arm V, of turn-table T, flanged at *t* and resting in an annular recess at the head of pipe M, or of a cap fitted thereto and confined by plates or blocks *t′*, substantially as herein set forth.

13. In a cable-railway-bridge system, the combination, with the draw, its abutment, the endless cable, and end guide-sheaves on the draw, of cable grip-guides offset as they approach and leave the joint of the draw with the abutment, and provided at the said joint with lateral extensions, substantially as and for the purpose set forth.

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