(No Model.) 4 Sheets—Sheet 1.

A. E. BROWN.

HOISTING AND CONVEYING MACHINE.

No. 300,689. Patented June 17, 1884.

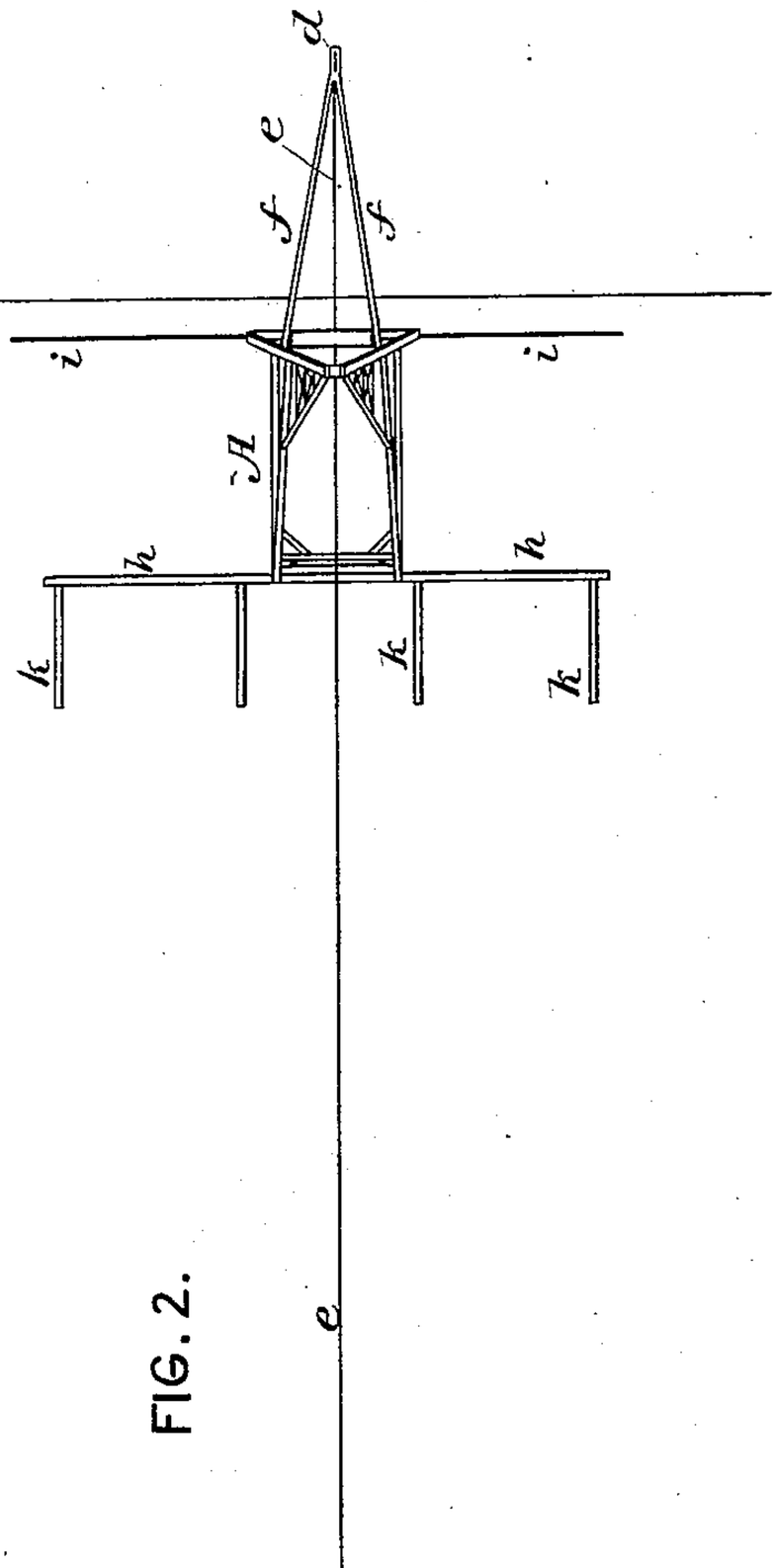
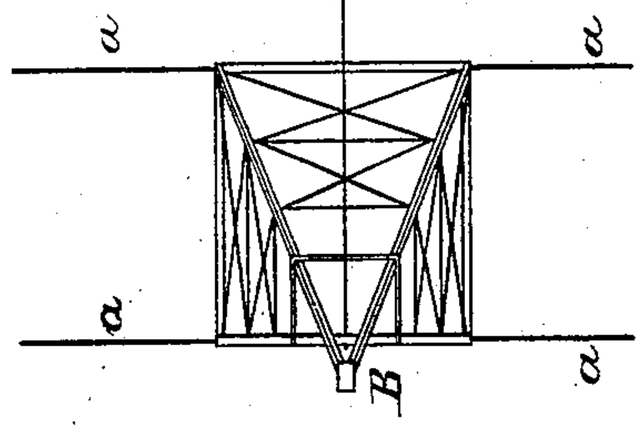


FIG. 2.



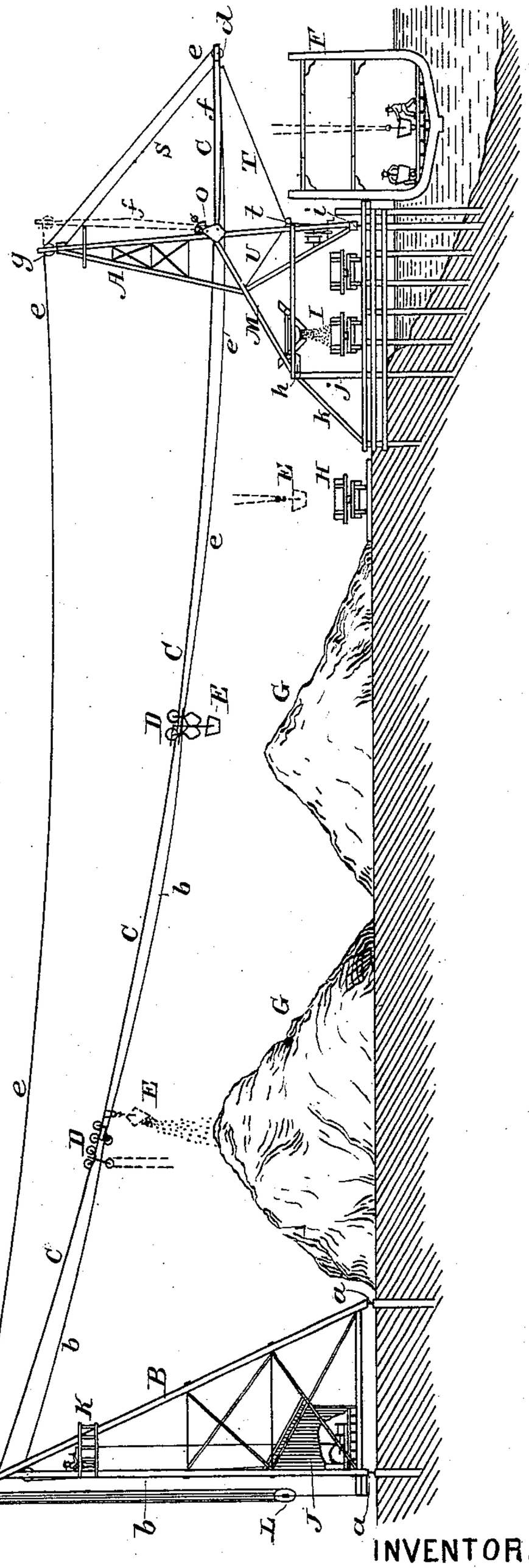


FIG. 1.

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HOISTING AND CONVEYING MACHINE.

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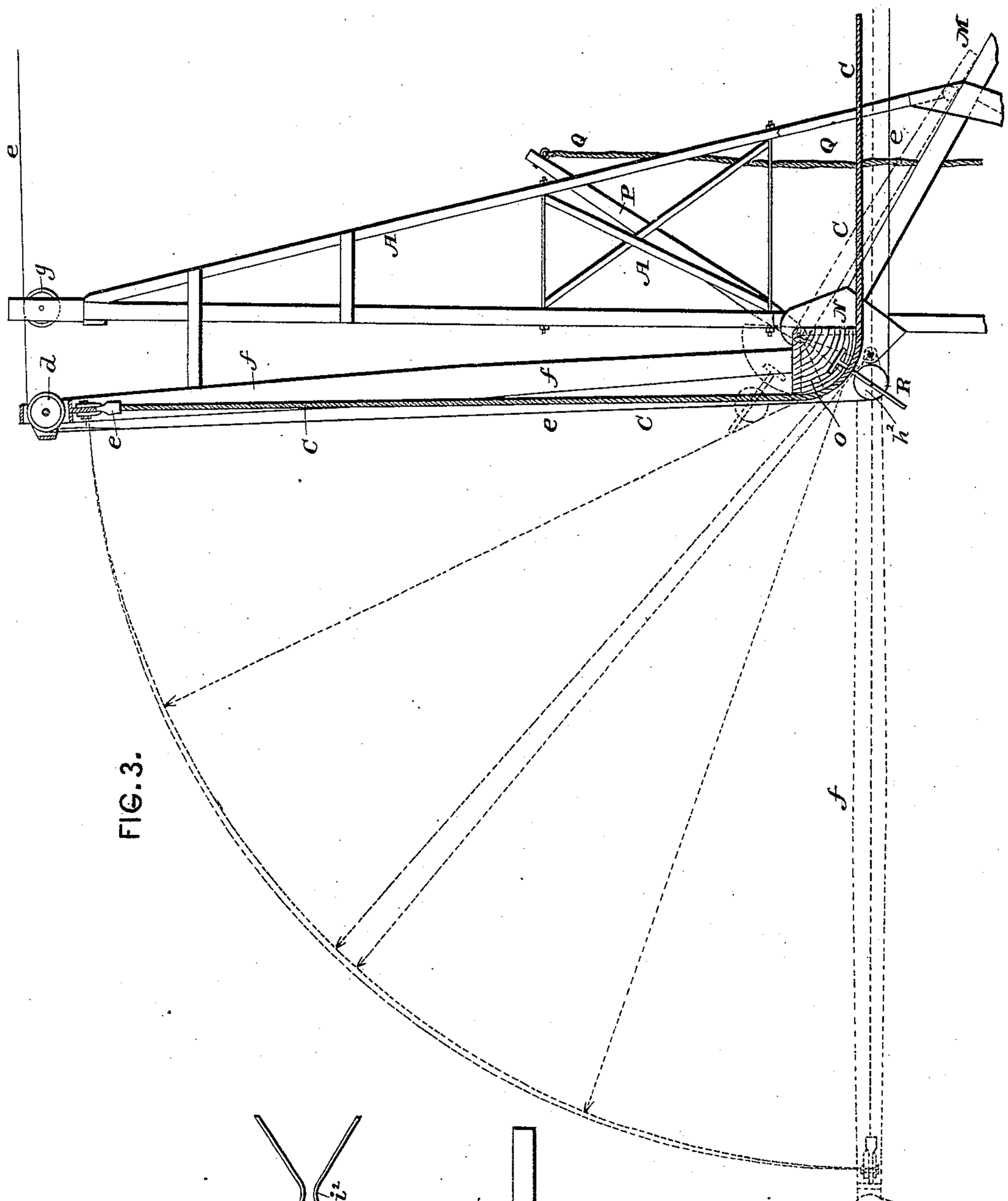

FIG. 3.

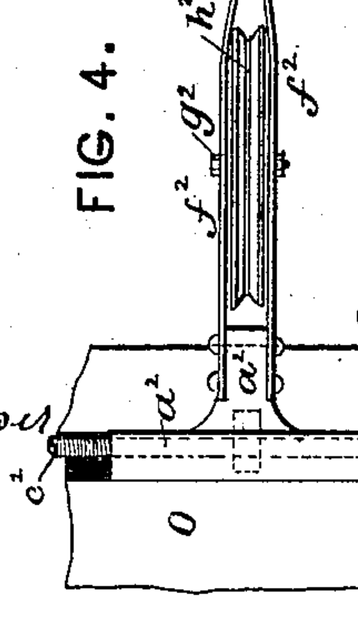

FIG. 4.

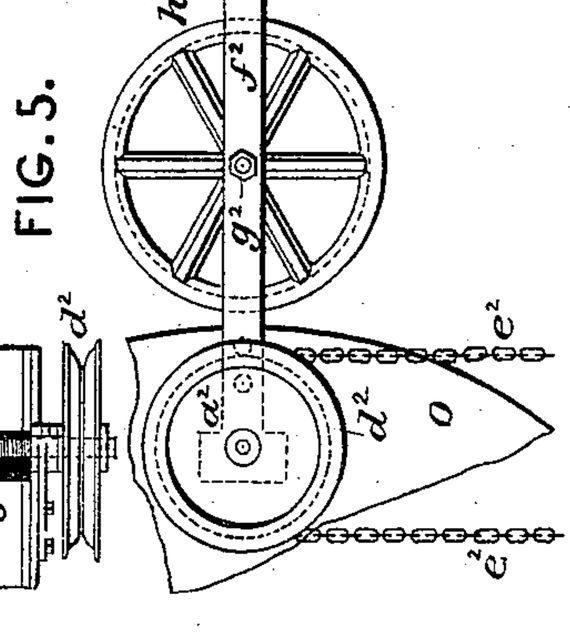

FIG. 5.

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HOISTING AND CONVEYING MACHINE.

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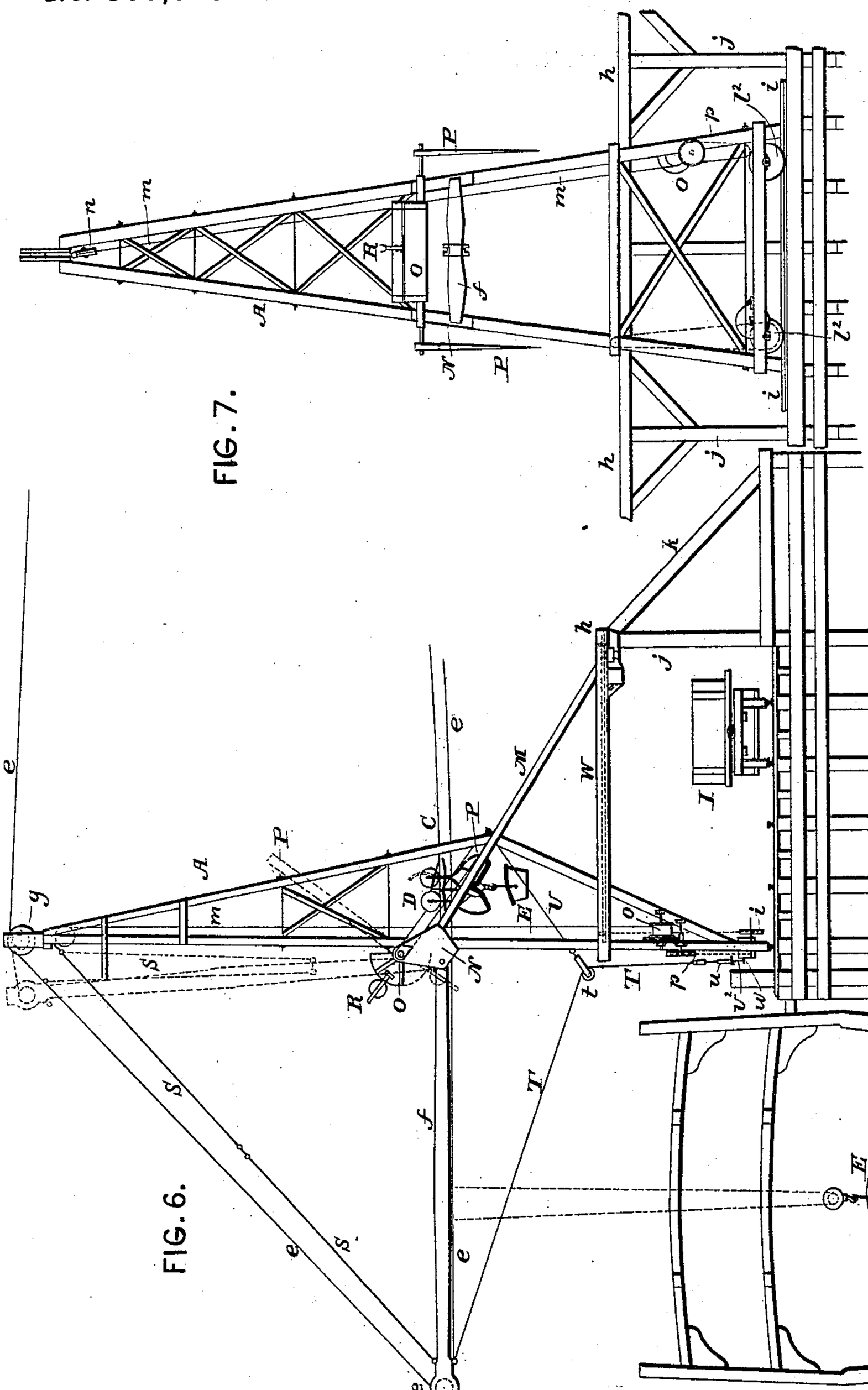

FIG. 7.

FIG. 6.

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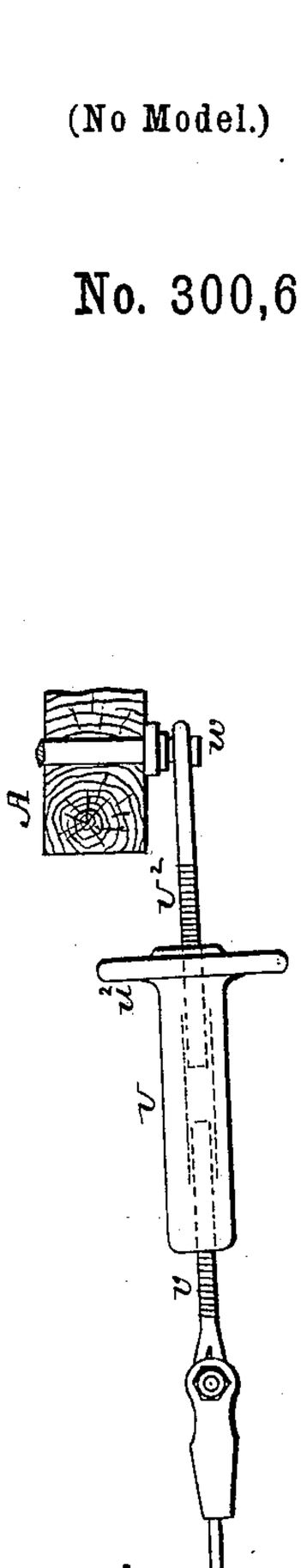

FIG. 9.

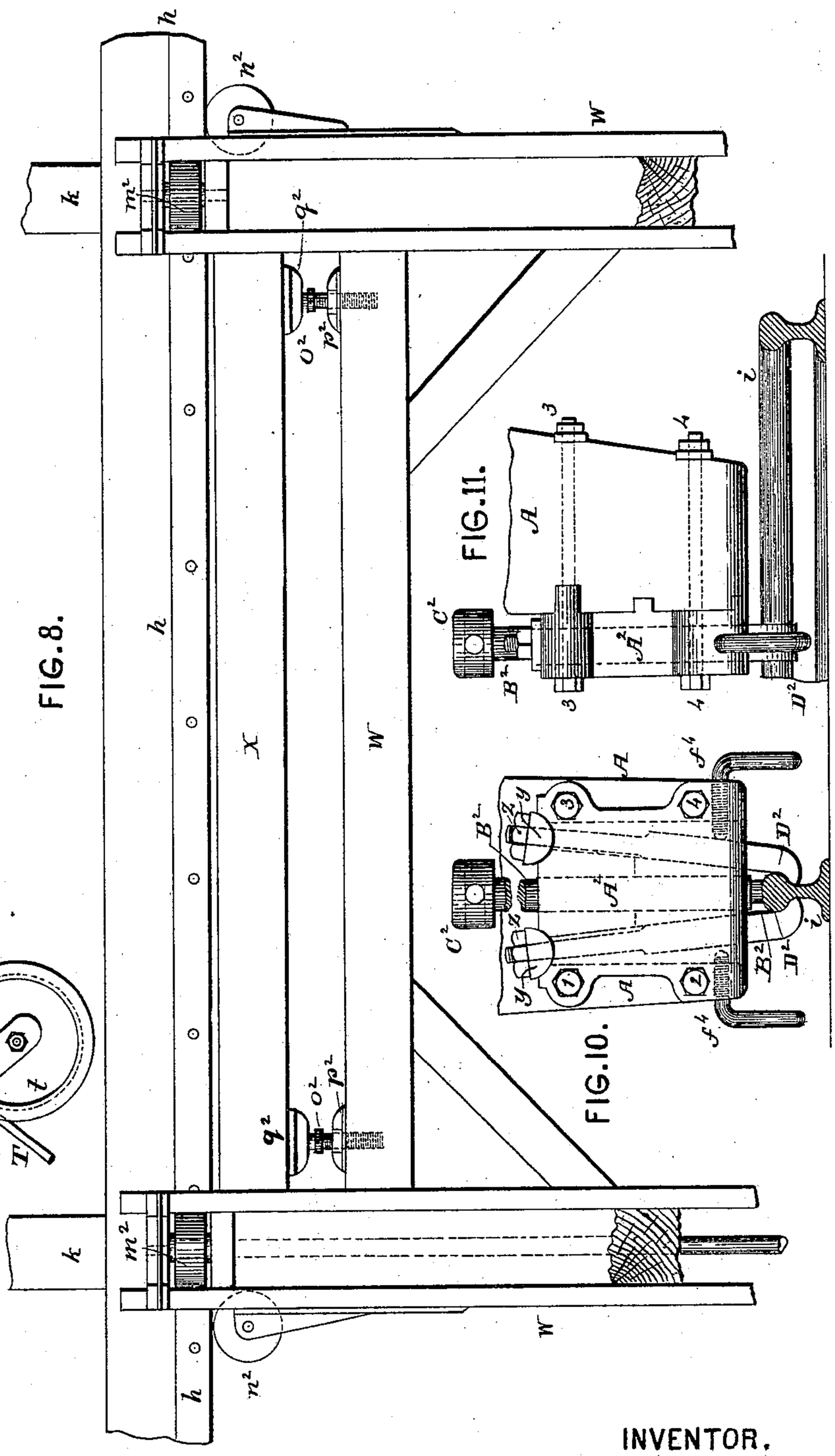

FIG. 8.

FIG. 11.

FIG. 10.

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UNITED STATES PATENT OFFICE.

ALEXANDER E. BROWN, OF CLEVELAND, OHIO.

HOISTING AND CONVEYING MACHINE.

SPECIFICATION forming part of Letters Patent No. 300,689, dated June 17, 1884.

Application filed December 7, 1883. (No model.)

To all whom it may concern:

Be it known that I, ALEXANDER E. BROWN, of Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Hoisting and Conveying Machines; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, making part of this application.

My invention relates to certain new and useful improvements in that class of hoisting and conveying machines in which a cable tramway is employed; and it consists in the several novel features of construction and novel devices and combinations of devices hereinafter described, and which will be more specifically pointed out in the claims of this specification.

To enable those skilled in the art to which my invention relates to understand and practice the several features thereof, I will now proceed to more fully explain my improvements as I have so far practiced them, referring by letters to the accompanying drawings, forming part of this specification, and in which I have illustrated my invention carried out in the best form now known to me.

In the drawings, Figure 1 is a side elevation of my improved cable-tramway hoisting and conveying apparatus. Fig. 2 is a top view of the same. Fig. 3 is a vertical section of portion of the outer pier and of the swinging apron or bridge on an enlarged scale. Fig. 4 is a detail horizontal sectional elevation; and Fig. 5, a detail end view (on a more enlarged scale) of a sheave device for the counterweight-cable. Fig. 6 is a side view (enlarged scale) of the front frame or outer pier. (Seen in the general view at Fig. 1.) Fig. 7 is a front view of the same. Fig. 8 is a plan or top view, increased scale, showing only a novel clamping contrivance for distributing the pushing-strain of the back braces of the outer pier-frame. Fig. 9 is a detail view of one of the hold down and tightener devices, which act as steadying-guys to the hinged apron when the latter is down in a working condition. Fig. 10 is a detail edge view, and Fig. 11 a detail face or front view, of the rail-clamping device combined with the lower end of the A-frame of the outer (and also, if necessary, with the frame of the inner) pier, to keep it from being lifted from the rail of the track by the pull or strain of the cable.

In the several figures the same part will be found designated by the same letter of reference.

Figs. 1 and 2 convey best a correct idea of the general arrangement of the main parts of the whole contrivance, while from the other views (which are drawn on larger scales) will be best gathered a correct understanding of the constructions of the several parts of the apparatus.

As will be observed by reference to Figs. 1 and 2, my improved apparatus is adapted to the purposes of hoisting ores and other materials out of boats and conveying the same to and depositing them at some desired locality on shore, or hoisting and conveying from on shore and discharging or loading into boats any such materials, or handling various materials in either loading into and unloading from cars stuff to be taken from or deposited at given localities on shore, or stuff to be transported from cars on shore to boats at the dock, or vice versa.

A (see Figs. 1 and 2) is the outer pier, or that one nearer the dock. B is the inner pier, and C is the cable tramway, upon which travels the hoisting and conveying carriage or machine proper, D, by means of which and its bucket E the material to be handled is either lifted out of a boat at the dock, as seen at F, and conveyed on shore and there deposited in piles G, or transported from the boat to cars at H, or from said cars or boat to cars at I, or from one locality on land to another, or otherwise, as the exigencies of the case may require.

The inner pier, B, is mounted on a railroad-track, *a a*, so that, as usual, it may be easily moved along sidewise to different localities, and contains or carries at or near its base the engine-house J, (containing the hoisting-engine,) and near its top the stand K, for the accommodation of the attendant who manages the apparatus and regulates those operations thereof which are not automatic. *b* is the hoist-cable, which, as usual, runs from the drum of the engine at J to the rear or inner side of the machine D, while *e* is the cable extending from the outer or forward side of machine D over an idler, *d*, (in the outer end of the bridge or hinged apron *f*,) and thence upward, ob-

liquely over an idler, *g*, in top of outer pier, A, and thence back over the top of pier B to the counter-weight L, all in a manner familiar to those skilled in the art, and according to constructions shown in United States patents heretofore granted to me on hoisting and conveying machines.

The outer pier, A, like the inner one, is mounted so as to be capable of movement or adjustment sidewise on a track, which is, however, composed of a forward rail, *i*, that is on the ground-level, and a hindmost rail, *h*, which is laid on an elevated horizontal beam arranged parallel to the rail *i* and supported by vertical posts *j*, (see Figs. 1 and 6,) and oblique braces K, (see Figs. 2 and 6,) that receive the backward thrust of the braces M of the pier frame-work.

At Fig. 1 the hinged apron or bridge *f* is shown in full lines down in its working position, and turned up into a position of disuse in dotted lines, while at Fig. 3 (which, being on a larger scale, better shows the construction of the bridge and its connections) these conditions of illustration are reversed.

Referring now more particularly to Figs. 3, 4, 5, 6, 7, it will be seen that the bridge *f*, (which is in the form of a V-shaped frame,) is hinged or pivoted at its root in peculiarly-shaped cast-iron shoe-pieces N, that are securely fastened to the frame-work of pier A, and is adapted to be raised up (into a nearly or quite vertical position) by means of a cable, *m*, which extends from a fastening to said frame near its outer end, over a pulley block or sheave, *n*, (see Figs. 6 and 7,) and thence down to a windlass-drum, *o*, on which it is wound. Said drum *o* is by preference turned by a system of gearing and a drive-chain, *p*, connecting the gear-shaft with a lower shaft provided with an ordinary crank-handle.

The condition of the cable tramway C when the bridge *f* is up is clearly shown at Fig. 3, where it will be seen that said cable then passes beneath and takes a partial turn around a sector-shaped bar, O. When the bridge is down, this device O is turned up, in the position seen in dotted lines at Fig. 3 and in full lines at Fig. 6, so as to be out of the way of the carriage or machine D, which can then travel without hinderance out toward and nearly to the outer end of bridge *f*. This device O is pivoted at its ends (or journaled) in the metallic shoes N, and is turned up or down, as occasion may require, by means of levers P, (see Figs. 6 and 7,) which are made fast to its journals, (at either end,) and provided with cords or ropes Q, by which said levers or arms P may be pulled down and fastened by hitching the lower ends of the cords onto a button or cleat on the frame-work of the pier. At Fig. 6 these levers P are shown pulled down and fastened, (so as to cause the device O to be held up out of the way,) while at Fig. 3 said levers are shown thrown up to allow the device O to come into the working or active position.

On the rocking shaft or device O is mounted a device for holding in place and guiding the counterbalance-cable *e*, the nature and operation of which I will now explain. This device is seen on a small scale at R, Figs. 3, 6, and 7, in the first of which it is shown in position for use, while in the last-named two figures it is shown adjusted, or set out of its working position. At Figs. 4 and 5 I have shown this device, in connection with a portion of the device O, on a scale large enough to reveal the details of its construction; and by reference now to said figures, in connection with Figs. 3, 6, and 7, it will be seen that this device for holding and guiding the cable *e* when the bridge *f* is up, and which is moved out of the way when the bridge is down, is composed of a stand, a^2, which is T-shaped, and the head of which rests and moves within a longitudinal slot, b^2, in device O, said head being bored and tapped for the accommodation of a screw-shaft, c^2, that is mounted within said slot b^2 of the device O, as shown, (see Figs. 4 and 5,) and which may be turned in either direction by means of a chain and chain-wheel, d^2 and e^2, to be worked by an attendant of the apparatus. An extension of said stand a^2 is formed with two side bars, f^2, which extend outwardly, as shown, and between which is hung, (to turn freely on its axle g^2,) a sheave or grooved-face pulley, h^2, in the peripheral groove of which works the cable *e'*, as will be presently explained. The side bars, f^2, are bent toward each other at the point i^2, and from thence to their outer ends are flared apart, as plainly seen at Fig. 4. The object of this peculiarity of construction is to effect more readily the guidance of the cable *e* toward the periphery of wheel h^2, and to thereafter facilitate the retention of the cable in place.

S is a jointed tie-rod, which extends, as seen at Fig. 6, from the upper end of pier A (where one end of it is fastened) to the outer end of the bridge, (where the other end is secured,) and which serves to support the weight of the free end of said bridge *f* when it is down in a working position, as shown at Fig. 6. When said bridge is drawn up, (into the position seen at Fig. 3,) the said tie-rod S, by reason of its joint, folds up into the condition indicated by the dotted lines at Fig. 6. T are hold-down ropes or guys, that extend from the outer end of the bridge *f* obliquely downward, and, passing over guiding-sheaves *t*, (see Fig. 6,) run thence downward toward projecting studs *w* in the lower part of the pier frame-work, to which, when requisite, their lower ends are fastened by fasteners *u*. The construction and operation of the appliances of these hold-down ropes will be best understood by reference to Fig. 9, where I have shown part of one of them and the fastener device, &c., on a larger scale. It will be seen that the lowermost portion of the cable or guy is composed of two threaded rods, *v* v^2, the adjacent ends of which are held within a nut or tightener, *u*, which, for convenience, is formed with a hand-wheel, u^2, and

that the lower end of v^2 is formed with an eye (or a loop,) to engage with the projecting end of pin *w*, while the upper end of *v* is secured to the cord or rope T. The yoke or frame k^2 of the sheave *t* is held by one end of a rope, U, (see Fig. 6,) the other end of which is fastened to the pier-frame, and the weight of the fasteners *u* and rods *v* v^2 is sufficient to hold up sufficiently in place the said guide-sheave or idler *t* during the use or operation (to be presently explained) of the guys.

In order that the pier A may be easily moved along on its track, which (as before stated) is composed of a lower rail at *i* and an elevated one at *h*, the forward lower portion of the pier-frame is provided with wheels l^2, that ride on top of an ordinary T-rail, and the rearward portion of said frame is provided (higher up) with two sets of wheels—one, m^2, that rests and rides on the flat rail *h*, (see Fig. 8,) and another, (turning on vertical axes,) which acts as bearers on and rides against the vertical outer side of the rail *h*. There being always more or less back-pull on the top of pier A, tending to force the back part of the horizontal framing W both downward and rearward, these two sets of wheels m^2 and n^2 are necessary; and to relieve the rail *h* and its sustaining-beam from undue pressure at only the two points where the wheels n^2 bear, during the working of the machine (when loads are being hoisted or conveyed, and the cable C is consequently pulling hard on the piers) I provide a clamping or strain-distributing bar, X, (see Fig. 8,) which is arranged just in front of the rail-beam of track *h*, and which, by simple appliances, is at pleasure forced outward from the frame W against the said beam.

The means shown for the purpose of working the strain-distributer consists of two jack-screws, o^2, that work at their threaded portions in the nuts p^2, let into the back beam of frame W, and at their outer ends or heads against metal bosses or bearing-plates q^2, secured to the forward side of the bar X.

The novel means I employ for locking down onto the rail those sides of the piers which, from the strain of the cable tramway, have a tendency to lift, is shown at Figs. 10 and 11 on an enlarged scale. I use a cast-iron housing, A^2, the back side of which has ribs that are let into the timber of the pier A, (see Fig. 11,) and which is securely bolted in place by bolts 1 2 3 4, passing through and through the casting and the timber to which it is secured. Within the said cast-iron housing is arranged a vertical centrally-arranged screw-shaft, B^2, the lower end of which is made at pleasure to either bear hard on or be slightly raised above the head of the track-rail *i* by turning down or up said screw-shaft, (by means of a key or lever applied to its head C^2, or in some other suitable manner.) Within suitable recesses or openings formed vertically through the casting A^2 are arranged also two claw-bars, D^2, which hang from their upper ends, where semi-cylindrical bearer-blocks *y* rest in correspondingly-shaped seats or bearings in the top of the casting, while nuts Z serve to hold the upper ends of the bars D^2 up, and also to draw up said bars, in a manner and for a purpose to be presently explained. These bars D^2 are made claw-shaped at their lower ends, so that they may be made (when so desired) to hook under the head of the rail *i*, and, by reason of being hung from their upper ends, on the sort of pivotal bearings (where the devices *y* rest in their curved seats) shown, the tendency of said bars D^2 is to swing away from the rail *i* at their lower ends. To force and keep them up to their work when it may be desired to have them occupy the relationship to rail *i* seen at Fig. 10, I employ set-screws f^4, (made, preferably, of bent rods, as shown,) by the turning in of which said bars D^2 are forced toward the rail *i* and held in place, as shown.

One of the greatest defects of cable tramway hoisting and conveying contrivances as heretofore made has arisen from the fact that when the bridge or apron has had to be raised up, not only has the cable and all its attachments been thrown into a useless condition, but, worse than this, it has been made so slack as to hang down in the way, and interfere with operations which it might be very important to perform in the space located between the dock (or outer pier) and the inner pier. In my improved apparatus these objections are entirely overcome, and, furthermore, the cable is placed and maintained in a perfectly taut and operative condition between the two piers whenever the bridge *f* is turned up. This great desideratum is accomplished, it will be seen, mainly by the use, in connection with the cable and bridge, of means for holding the cable taut from the hinged line or root of the bridge (or from thereabout) to the fixed point of attachment of the cable to the inner pier. When the bridge is down, as in Fig. 6, the carriage that travels on the cable may run clear out over the water, and thence back to any desired extent; and when the bridge is up, as at Fig. 3, the cable C is maintained in a perfectly proper condition from the point where it passes beneath the device O rearward to the point of its attachment to the top of the inner pier. Hence, with my improved machine, when not in use with the bridge, the cable C, with its carriage D, and all other appliances, may be used for hoisting, conveying, lowering, &c., at all points within the range covered from the outer to the inner pier. When the bridge is let down, the device O is turned up, so that then the roadway on the cable C is clear for the passage beneath said device of the carriage D.

Heretofore the bridge or apron has been combined with the pier-frame and cable, so that the pull or strain of the latter tended all the time to pull up the bridge during use. This has been a great objection, on account of the constant tetering caused, and the difficulty of lowering the bridge against the strain of the cable, and for other reasons. In my improved

construction it will be seen that by having the bridge arranged to be nearly or quite in line with the cable C when down the pull of the cable does not operate to pull the bridge up, but makes a dead-lock by pulling against the dead-center of the hinged bridge *f*, and by the use of the device O the pull on the cable does not tend to prevent the easy descent of the bridge when up. This dead-pull endwise on the bridge *f* is imparted almost directly into the rear braces, M, of the pier-frame, and through them endwise onto the rear track, *h*, which is braced at *k* in the direction of the thrust. In this manner is effected the best distribution of the cable-strain on the whole structure, so that with a minimum amount of stock and weight of apparatus can the maximum strength and rigidity throughout be gained.

The arrangement and operation of the device O is such, it will be understood, that when the bridge *f* is to be turned up into the position seen at Fig. 3 said device is turned down, as there shown, and then the elevation of the bridge causes the cable C to take a partial turn round the device O, as shown, so that the strain of the cable from O back to the back pier, B, does not come much on the bridge *f*. At Fig. 3 I have drawn two dotted quarter-circles, which indicate, one, (the inner one) the curve described by the point of attachment of the cable C to the end of bridge *f*, the other (and outer one) the curve that would be described by the end of the cable were it not fastened to the bridge, but kept merely equally taut during its upward swing; and from these lines it will be seen that during the mevement of the bridge the cable C (being bent up around the device O, as shown) tends to pull less on the point of attachment to the bridge during the greater part of its movement than at the beginning and ending thereof, since during the greater part of the movement the cable is eased up on. As already seen, when the bridge is down, as at Fig. 6, the device O is up out of the way of the carriage D, and the cable *e*, running from D to the counterweight L, (see Fig. 1,) passes along beneath the bridge *f* and over the sheave or idler in the end of *f;* but when the bridge is turned up then the cable *e* is held still in a proper working condition by making a partial turn around the device R, (see Fig. 3,) and passing thence vertically upward, as seen. At the same time this device R could not be a fixture, (or permanently arranged in the position shown at Fig. 3,) because it would then be in the way of the travel of the carriage D and its attachments, when the machine might have the bridge down. Therefore the device R is arranged on the device O, so as to turn up with it, and is also arranged (as I have already explained) so as to be adjustable lengthwise of the device O, in order that it may be moved laterally entirely out of the way of the carriage D and other moving parts of the conveyer, when the bridge *f* may be down and said guide device R consequently not desired for use, and also so that it may be set at different points, where it will always catch or receive the counterweight-cable during the elevation of the bridge.

By the use, in combination with the bridge, of guys T with weighted fasteners, and passing over suspended guide-sheaves *t*, as I have already explained, it will be seen that on unfastening the hooks v^2 from the pins *w* and elevating the bridge *f* the fasteners will simply be elevated and the guys T caused to assume lines nearer to straight vertical ones, and that on lowering the bridge these guys will be caused by the gravity of the fasteners to resume nearly the proper position for refastening, so that all the attendant has to do is to slip the hooks of v^2 over the pins *w* and screw up (a few turns) the nut-like device *u*, which (in unfastening the guys) he had previously unscrewed. This I have found to be a simple, efficient, and durable arrangement, easily managed.

By the construction of the outer pier in substantially the manner shown, with a light vertical frame, somewhat A-shaped, suitably braced, and a horizontal framing, W, supported at the rear by vertical beams or piers *j* and oblique braces *k*, (with a track-rail at *h*,) I am enabled to get space and head room to run trains or cars (as at I) close up to the outer framing and outer track rail, *i*, and consequently close to the outer edge of the dock or shore-line.

The horizontal bearing-wheels at n^2, to transmit the back-pull on the pier A to the rear rail-beam at *h*, should, in the case of a modified form of pier, (in which the rear rail might be down on a level with rail *i*,) be placed so as to work against the forward rail, *i*.

In practice, I have found a pier, A, when made principally of wood, to be most desirable when made in the form shown; but were the pier made of iron all the shown advantages over old forms might be gained and at the same time have the rear rail, *h*, placed lower down.

By the clamping device or strain-distributer X, I avoid the undue strain at two more points that would arise were the wheels n^2 alone allowed to press on the beam of track *h* when the pier is set in a given position and the hoist and tramway apparatus are at work. Furthermore, this clamping device creates a friction sufficient to insure the pier against lateral movement on its track when set in position for the running of the hoisting and conveying apparatus.

By the use of means such as I have shown and described for locking the pier-legs down to the rail *i* the objections resulting from the sort of ice-tongs arrangement heretofore used are avoided.

Heretofore the upward pull on the rail (due to the tendency to tip over the pier) has operated through the old-fashioned locking or holdfast devices to spring and bend up the rail, so

as to get it out of level, thus destroying the perfect operativeness of the contrivance as a whole. By use of my improved appliance the pier is securely made fast to the rails by the perfect clamping of the head of the rail between the lower underlying claw-like ends of the devices D^2 and the downward forced lower end of the set-screw B^2, and the pier is thus bodily clamped (practically throughout the length of its whole base) to the rail, so that the latter will not be bent or sprung out of place at small points, thus eventually destroying the evenness of the whole roadway. At the same time the construction of my contrivance is simple, economic, strong, and durable, while it can be most easily operated perfectly without the exercise of any high order of mechanical judgment.

As is well understood by those skilled in the art there is more liability to pull over the back pier than the front one on account of its greater height. The placement of the engine-house, hoist machinery, &c., in the lower part of this pier, as shown at J, Fig. 1, enables me to make the pier itself lighter, and consequently sufficiently strong at less expense, since I get the benefit of the weight (and the leverage over the fulcral point) by the pressure of these heavy appliances, located, as shown, at the rearmost portion of the base of the pier.

If found expedient, the engine-house may be made purposely very heavy, (by a stone flooring, &c.,) or in addition to the necessary material the weight may be supplemented by heavy stone-work located within or adjacent to the engine-house.

The general operation of the apparatus as an entirety needs little or no special explanation in view of all that I have so far explained, and the drawings and the familiarity of those skilled in the art with my patented and other cable-tramway hoisting and conveying apparatus.

What I claim as new, and desire to secure by Letters Patent, is—

1. In combination with the piers and cable of a cable tramway for hoisting and conveying apparatus, the hinged bridge or apron, constructed and arranged as specified, so that when raised or turned up the cable is correspondingly bent or turned up, and is thus retained in a taut and useful condition for that portion of its length which remains distended between the two piers, substantially as set forth.

2. In combination with the piers, the cable and the bridge or apron, a device for holding the cable taut during and after the upward vibratory movement of the bridge, and operating as specified, so that during the upward movement of the bridge the pull of the cable cannot operate to either impede or render more difficult the said movement of the said bridge.

3. In combination with the outer pier, the cable and the bridge, the device O, (or its equivalent,)capable of being moved out of the way of the carriage D whenever the bridge may be down, all substantially as hereinbefore set forth.

4. In combination with the outer pier and the cable tramway, a hinged bridge or apron arranged and operating, as described, to receive the pulling-strain of the cable in a direction corresponding, substantially, with the direction of the length of the bridge, as set forth.

5. In combination with the piers, the bridge, the main cable C, and the counterbalance-cable *e*, the device for holding the counterbalance-cable whenever the bridge and main cable may be turned up, so that it will continue to work as well then as when the bridge may be down, all substantially as hereinbefore set forth.

6. The movable or adjustable counterbalance-cable-holder device h^2, constructed and operating as specified, so that it may be moved or adjusted out of the way when the counterbalance-cable extends in a substantially horizontal direction from the back pier to the outer end of the bridge, and can be set or adjusted to come over and in line with said counterbalance-cable for the purpose of holding the latter properly when the said cable and bridge shall be turned up, all as hereinbefore set forth.

7. In combination with the apron or bridge, weighted hold-down rods, chains, or guys provided with fasteners, and having arranged with them guide-sheaves, such as seen at *t*, the whole arranged and operating to render easy the securement of the outer end of the bridge to the holdfast-pins near the base of the pier and their releasement therefrom, as occasion may require.

8. In combination with the base of a pier and the track on which it rests, rollers mounted on vertical axes and adapted to facilitate the adjustment of the pier on its tracks, and at the same time prevent any displacement of the pier from the track sidewise of the latter, all as hereinbefore set forth.

9. In combination with a pier and the track on which it rests and on which it is designed to be adjusted, a device, substantially such as specified, for distributing the side strain on the track-beam, and at the same time creating a frictional contact, which tends to hold the pier in place (endwise) on the track, the same constructed and operating substantially as hereinbefore set forth.

10. The rail-clamping device shown and described for holding the pier down on the track-rail, consisting, essentially, of claw-like devices adapted to catch beneath the head of the rail, means for exerting a downward pressure on the rail, and means for easily adjusting the claw-like devices toward each other and for holding them in place, all substantially as hereinbefore set forth.

In witness whereof I have hereunto set my hand this 10th day of November, 1883.

ALEXANDER E. BROWN.

In presence of—
GOTTLIEB GENDER,
CHAS. W. KELLY.