J. L. HARRINGTON.

LIFT BRIDGE.

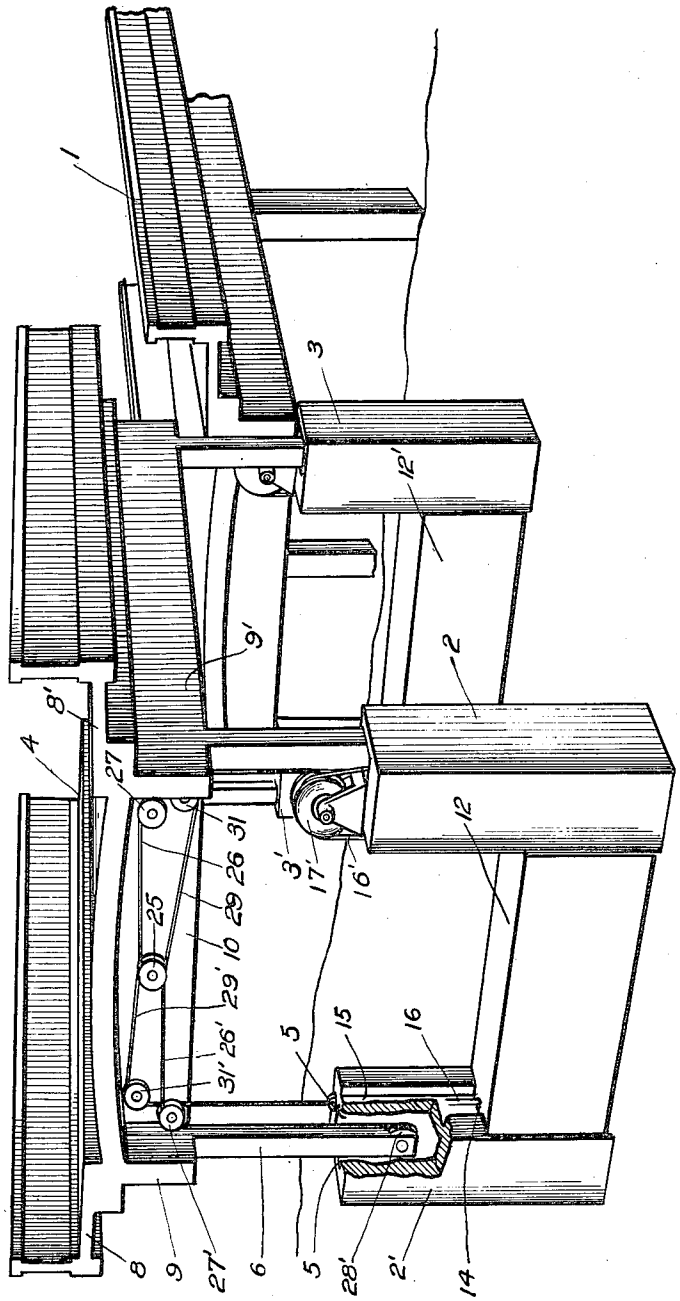
APPLICATION FILED OCT. 10, 1917.

1,285,696.

Patented Nov. 26, 1918.

3 SHEETS—SHEET 1.

Fig. I.



INVENTOR.

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Fig. II.

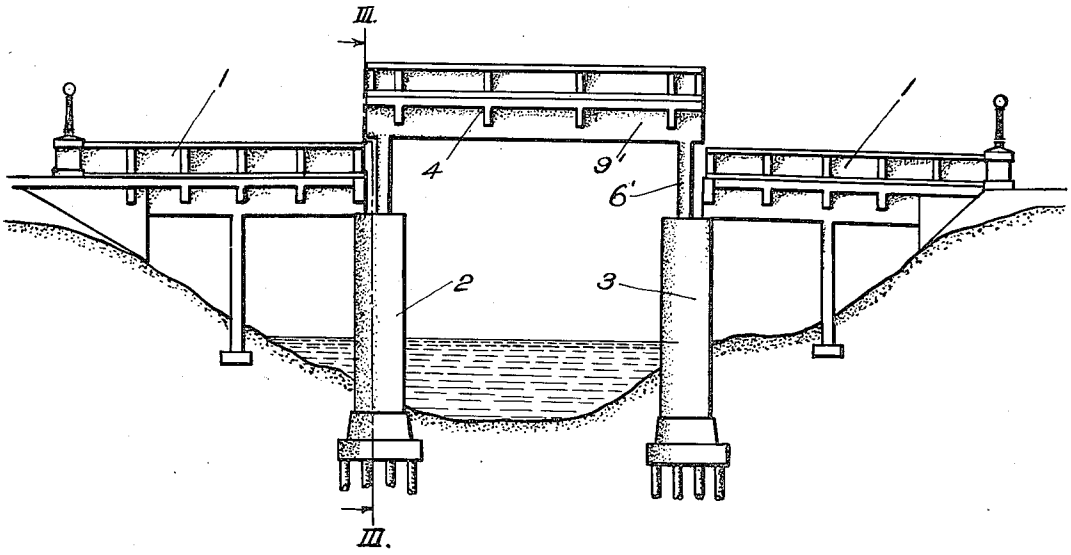
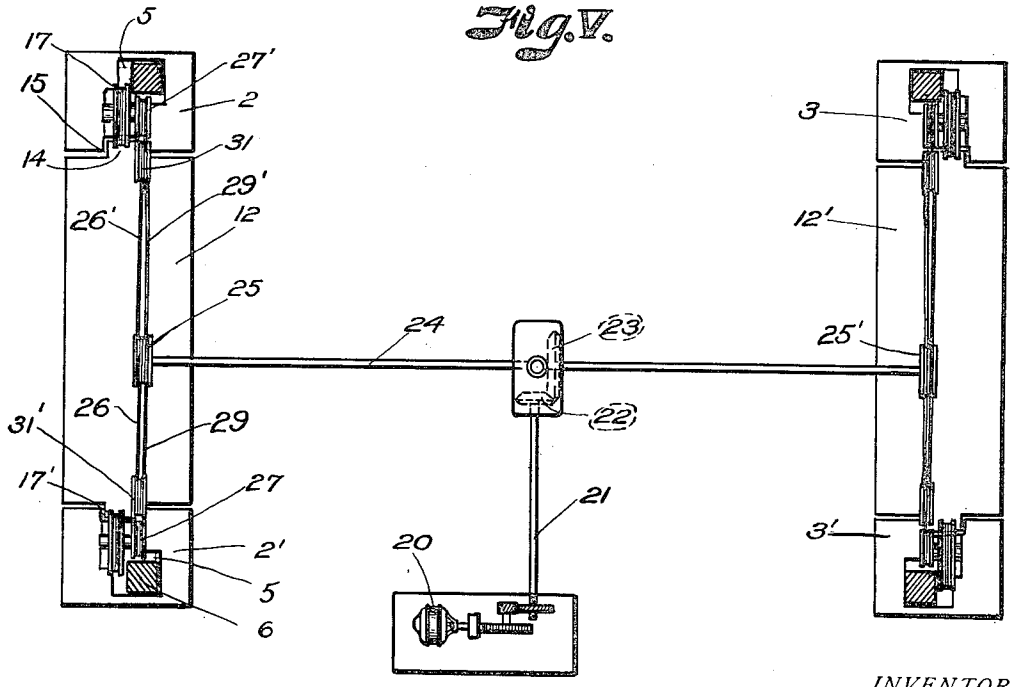


Fig. V.



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3 SHEETS—SHEET 3.

Fig. III.

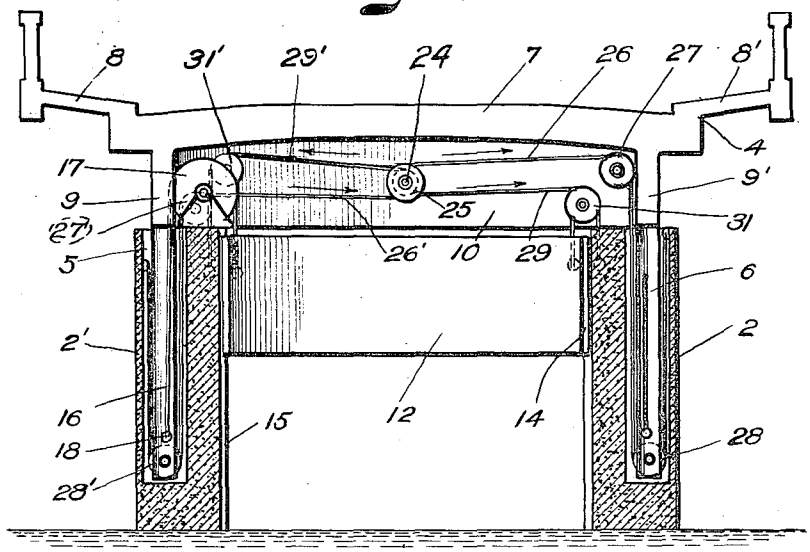
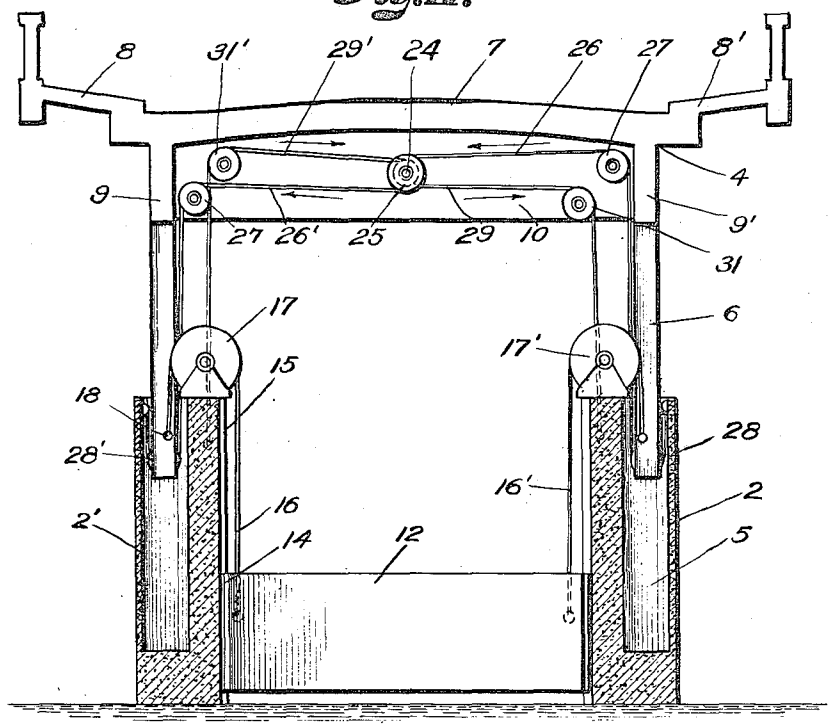


Fig. IV.



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UNITED STATES PATENT OFFICE.

JOHN LYLE HARRINGTON, OF KANSAS CITY, MISSOURI.

LIFT-BRIDGE.

1,285,696. Specification of Letters Patent. Patented Nov. 26, 1918.

Application filed October 10, 1917. Serial No. 195,813.

To all whom it may concern:

Be it known that I, JOHN LYLE HARRINGTON, a citizen of the United States, residing at Kansas City, in the county of Jackson and State of Missouri, have invented certain new and useful Improvements in Lift-Bridges; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

My invention relates to lift bridges and more particularly to bridges of a type comprising a counterweighted lift span and power mechanism for raising the span to permit the passage of a vessel therebeneath and for lowering the span to functional position, the object of the invention being to effect convenience and sightliness of the structure by arrangement of the counterweight and power mechanism.

In accomplishing this object I have provided improved details of structure, the preferred forms of which are illustrated in the accompanying drawings, wherein:—

Figure I is a perspective view of a lift bridge embodying my improvements, showing the lift span in elevated position.

Fig. II is a side elevation of the same.

Fig. III is a transverse vertical section on the line III—III, Fig. II, showing the span in lowered position.

Fig. IV is a view on the same line as the parts would appear with the span lifted.

Fig. V is an enlarged detail plan view of the power mechanism.

Referring more in detail to the drawings:—

1 designates fixed bridge spans of any suitable construction and design, supported at their approach end and at their intermediate points in any suitable manner, and resting at their facing ends on the outer edges of paired column piers 2—2′ —3—3′, preferably of reinforced concrete, and having sufficiently stable foundation to support the inner ends of the fixed spans and to wholly support a movable span 4.

The piers 2—2′ and 3—3′ are paired transversely of the bridge and each preferably comprises a chamber 5 arranged near the outer side of the pier and open at the top to receive a standard 6 that extends downwardly from and forms a part of the movable span.

The preferred construction of the movable span 4 comprises the roadway portion 7 and walks 8—8′ at its opposite sides which coöperate, when the span is in lowered position, with similar parts of the fixed spans to form continuous central and side passages.

Extending longitudinally along the opposite sides of the lift span are girders or trusses 9—9′, and connecting the same are transverse beams 10, the latter being closely adjacent the opposite ends of the span. The ends of the girders or trusses 9—9′ are adapted to seat on the upper ends of the supporting piers to support the span in cooperative alinement with the side spans.

Suspended from near the opposite ends of the girders or trusses 9—9′ are the standards 6 which are vertically movable along the piers 2—2′ and —3—3′ and, when the piers are provided with chambers 5, extend into and move therein, the length of the standards being such that when the span is at rest their ends will terminate adjacent the bases of the pier chambers.

Slidably mounted between the paired piers 2—2′ and 3—3′ are counter-weights 12—12′, each of which has a weight practically equal to one half the weight of the lift span and which are provided at their opposite ends with guide ribs 14 which slidably seat in guide channels 15 in the pier faces to retain the counterweights in functional position between the piers.

The counterweights are preferably of concrete and embedded or otherwise secured to their opposite ends are paired cables 16—16′ which are run upwardly and over sheave wheels 17—17′ on the upper ends of the piers and then downwardly within the channel chambers 5, where they are connected, by pins 18, to the lower ends of the standards 6, the arrangement being such that when the span is in lowered position, the counterweights will be raised, preferably to a level with the upper ends of the piers, and when the span is raised the counterweights are lowered correspondingly to the lift of the span.

The mechanical means provided for operating the movable span comprises a motor 20 of any suitable nature which may be conveniently located on the span and which is connected through suitable gearing with a shaft 21 that preferably extends beneath the

bridge floor to a central point where it is operatively connected, by meshing gears 22 and 23, with a shaft 24 that extends longitudinally beneath the span and projects through and is revolubly mounted at its ends in the end cross beams 10.

Mounted on the opposite ends of the shaft 24 are cable drums 25—25′ to which are attached the inner ends of paired lift cables 26—26′. The cables 26—26′ are extended from the drums in opposite directions to wind or unwind simultaneously and are passed over guide wheels 27—27′ revolubly mounted adjacent the ends of the beams 10, thence downwardly along the inner faces of the standards 6, over sheave wheels 28—28′ that are inset at the ends of the standards, then upwardly along the outer faces of the standards and are attached, at their outer ends to the walls of the piers adjacent the opening of the chamber 5.

With this arrangement power transmitted by the motor through the shaft 21 revolves the shaft 24 to wind the cables 26—26′ on the drum 25. As the cables are wound on the drum the lengths of cable between the guide wheels 27 and the anchored ends are shortened, causing the standards to be lifted within the pier chambers and the span to be raised from its normal level. As all of the cables are wound equally on the drums it will be seen that the span will be lifted an equal distance at its suspended points and no unequal strain is placed on the supporting or lifting parts.

To insure an even lifting of the span at all its suspension points regardless of any uneven loading and to effect lowering of the span, I provide paired cables 29—29′ which are attached to drums 25—25′ on the shaft 24 and which wind from opposite directions thereon and extend outwardly over sheave wheels 31—31′ and then downwardly and are attached to the piers.

It will be seen that by so arranging the cables, as the shaft 24 is revolved to raise or lower the span the cables 26—26′ are wound or unwound from the drums 25 and the cables 29—29′ pay out equally with the movement of the span, and as the cables are drawn tight when the drums are revolved in one direction, a pull on one pair of cables is induced that is sufficient to induce upward movement of the span and when the drums are revolved in the opposite direction pull on the other pair of cables is induced to lower the span, it being apparent that as the span is counterbalanced by the weights 12—12′ a relatively slight pull on the cables is required to induce movement of the span.

Assuming that a lift bridge of the character mentioned is provided with an operative mechanism constructed and arranged as described, and further that the lift span is at its normal road position, and it is desired to open the channel to permit a vessel to pass beneath the bridge, the operator starts the motor to actuate the shaft 21 which, through the gear wheels 22—23 actuates the shaft 24 to revolve the drum 25 and wind the cables 26—26′ thereon.

As the cables are in fixed relation to the drum and to the piers, winding of the cables on the drums moves the span upwardly and when at the desired level it is stopped by stopping the motor and is held at such position by the counterweights.

To lower the span the motor is reversed to wind the cables 29—29′ on the drums 25—25′ and unwind the cables 26—26′, the winding of the cables 29—29′ pulling on the fixed anchorage of the cables to lower the bridge against the tension of the counterweight.

By having the drums on which the cables are wound driven by a shaft common to both, the drums are turned relatively to each other at the same angular speed and even travel is insured as the span is raised or lowered.

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

1. In a lift bridge, a vertically movable span having a depending standard at each corner, an individual pier column for each standard having an upwardly opening chamber in which the standard may travel, a counterweight movable between the paired pier columns at each end of the span, connection between each standard and the adjacent counterweight and lifting means connected with the standards.

2. In a lift bridge, a vertically movable span having a depending standard at each corner, an individual pier column for each standard having an upwardly opening chamber in which the standard may travel, a counterweight movable between the paired pier columns at each end of the span, connection between each standard and the adjacent counterweight and lifting means carried by the span and connected with the standards.

3. In a lift bridge, a vertically movable span having a depending standard at each corner, an individual pier column for each standard having an upwardly opening chamber in which the standard may travel, a counterweight movable between the paired pier column at each end of the span exteriorly of the standard columns, connection between each standard and the adjacent counterweight and lifting means connected with the standards.

4. In a lift bridge, a vertically movable span having a depending standard at each corner, an individual pier column for each standard having an upwardly opening chamber in which the standard may travel, a counterweight movable between the paired

pier columns at each end of the span, a sheave wheel on each pier column and a cable connected with each end of each counterweight, run over the adjacent sheave wheel into a column chamber and connected with the lower end of a standard.

5. In a lift bridge, a vertically movable span having a depending standard at each corner, an individual pier column for each standard having an upwardly opening chamber in which the standard may travel, a counterweight movable between the paired pier columns at each end of the span, a sheave wheel on each pier column and a cable connected with each end of each counterweight, run over the adjacent sheave wheel into a column chamber and connected with the lower end of a standard, and means carried by the span and operable on the standards for moving the span.

6. In a lift bridge, a vertically movable span having a depending standard at each corner, an individual pier column for each standard having an upwardly opening chamber in which the standard may travel, a counterweight movable between the paired pier columns at each end of the span, a sheave wheel on each pier column and a cable connected with each end of each counterweight, run over the adjacent sheave wheel into a column chamber and connected with the lower end of a standard, a shaft on the span, cables operatively connected with the shaft and anchored to the pier columns, and sheave wheels on the lower ends of the standards engaging the last named cables.

7. In a lift bridge, a vertically movable span having a depending standard at each corner, an individual pier column for each standard having an upwardly opening chamber in which the standard may travel, a counterweight movable between the paired pier columns at each end of the span, a sheave wheel on each pier column and a cable connected with each end of each counterweight, run over the adjacent sheave wheel into a column chamber and connected with the lower end of a standard, a shaft on the span, cables operatively connected with the shaft and anchored to the pier columns, and sheave wheels on the lower ends of the standards engaging the last named cables, and other cables connected with shaft to operate oppositely said last named cables and connected with the pier columns, for the purpose set forth.

In testimony whereof I affix my signature.

JOHN LYLE HARRINGTON.