E. SWENSSON.

LIFT BRIDGE.

APPLICATION FILED DEC. 9, 1907.

911,628.

Patented Feb. 9, 1909.

4 SHEETS—SHEET 1.

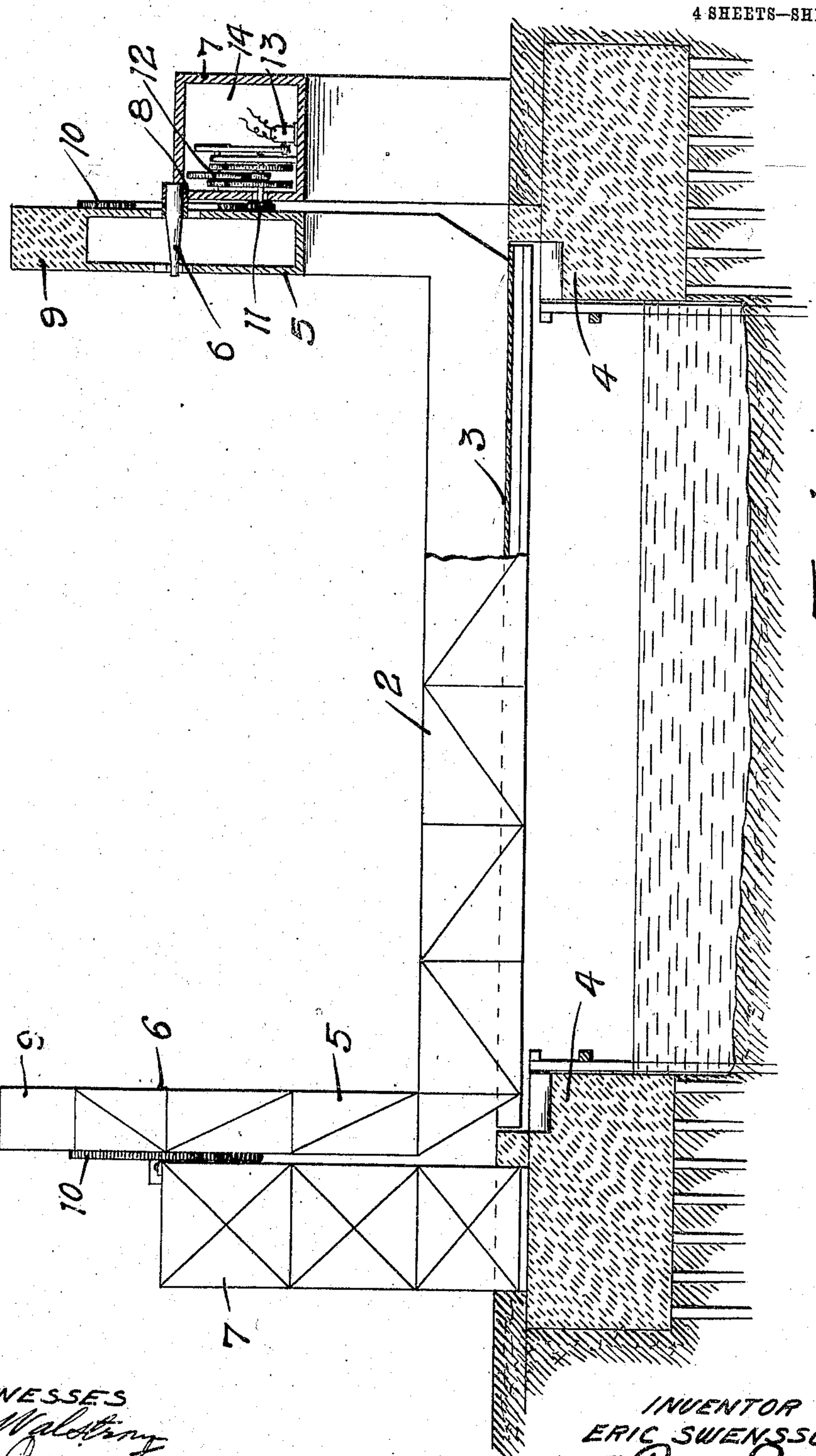

Fig 1.

WITNESSES

J. B. Byington

INVENTOR

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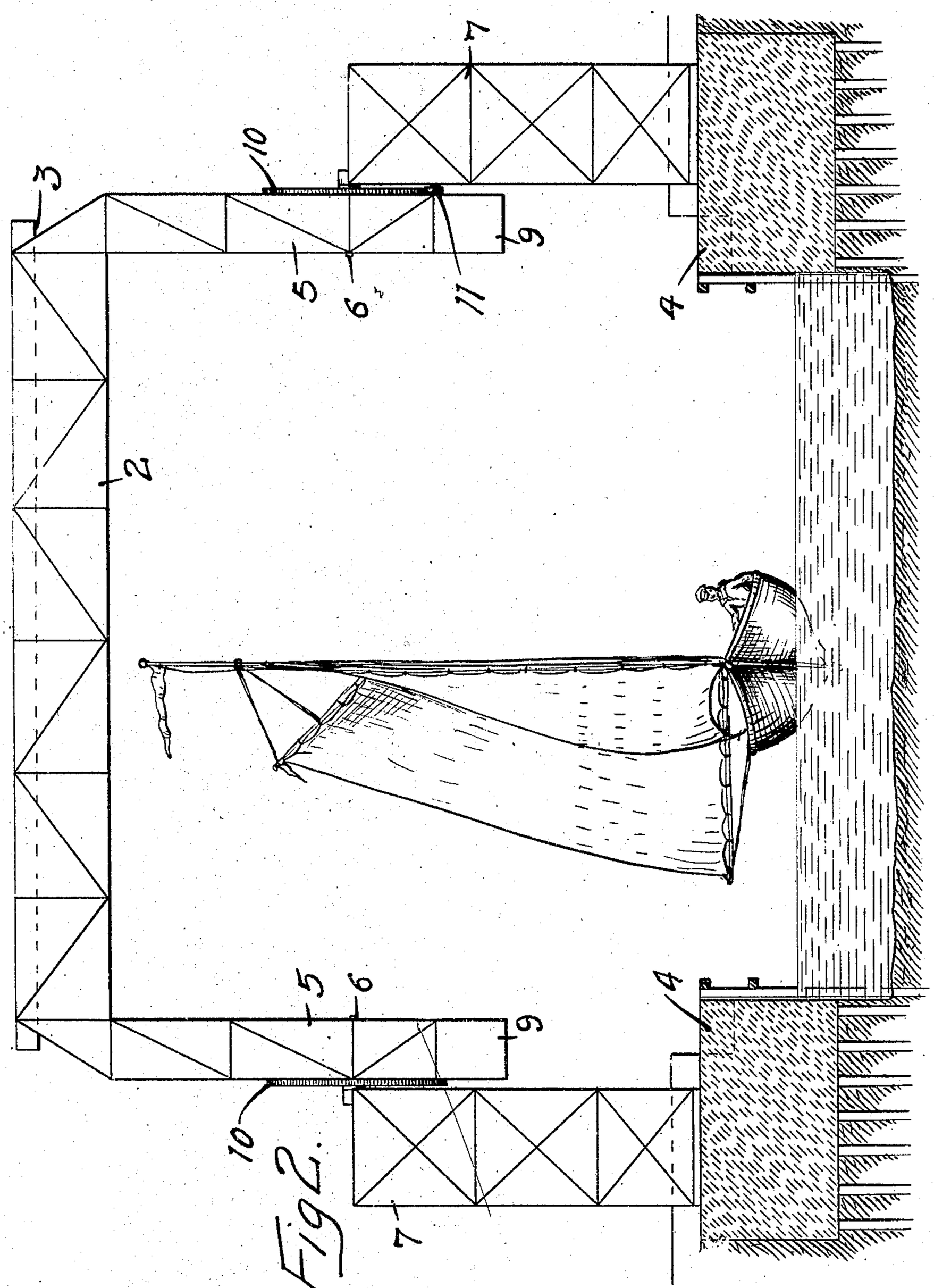

Fig 2.

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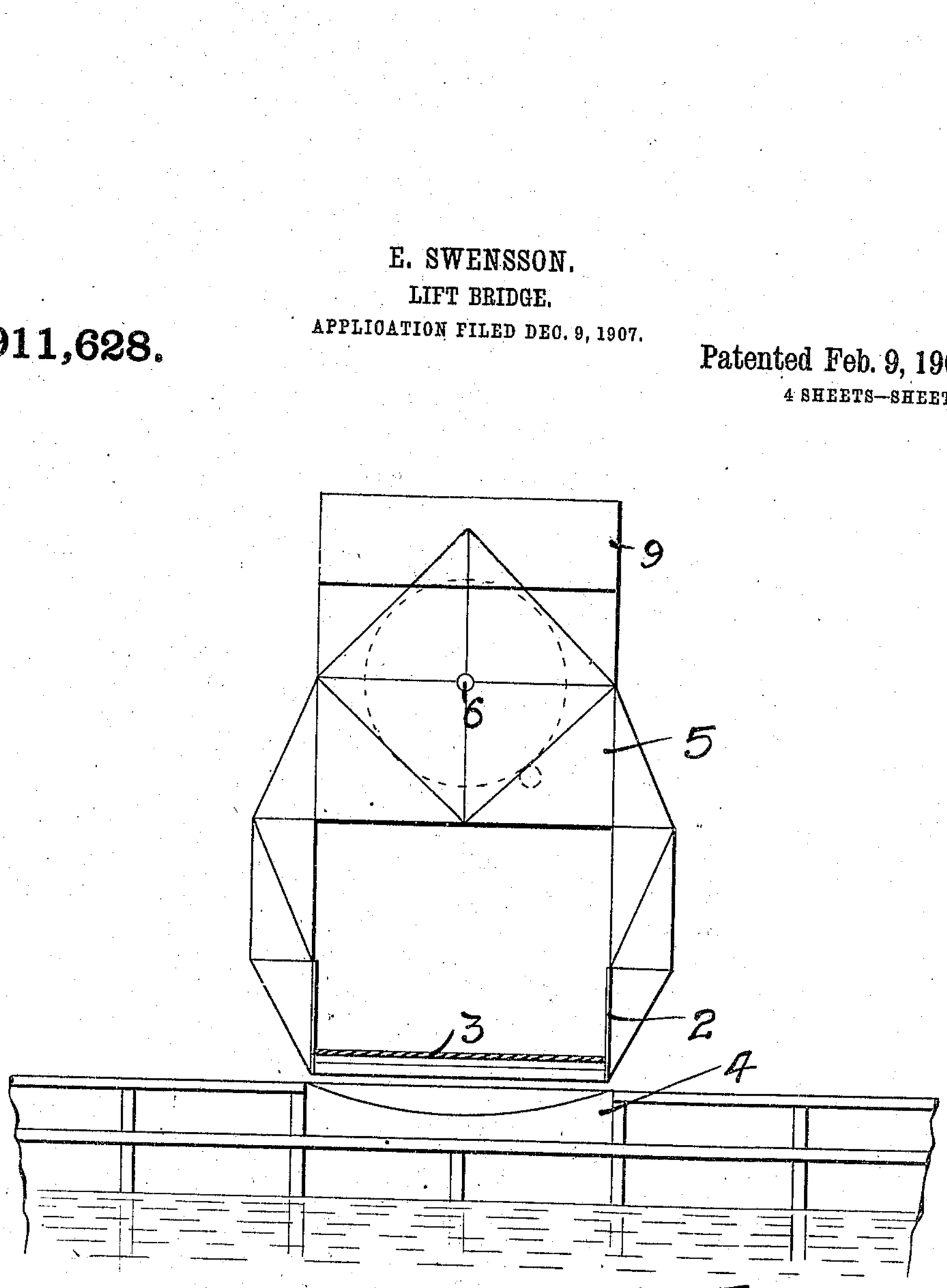

Fig 3.

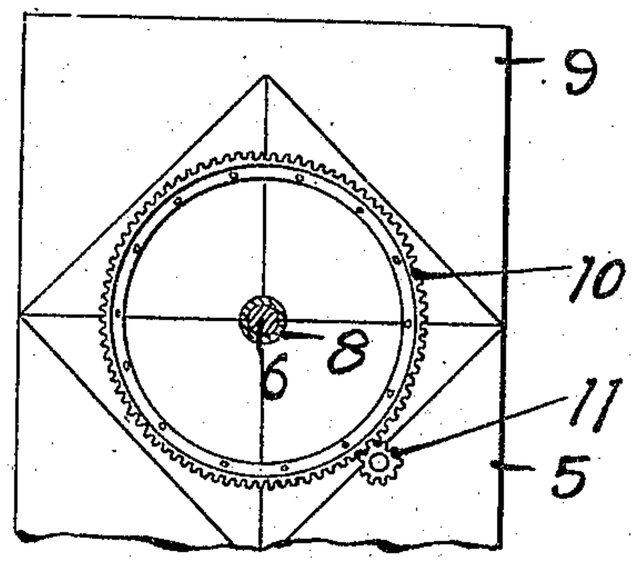

Fig 4.

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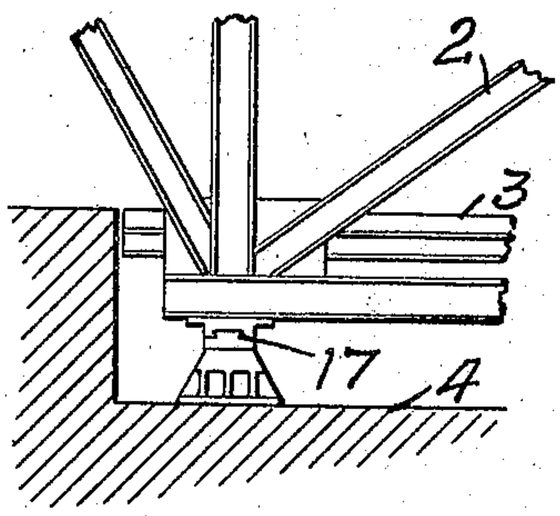

Fig 6.

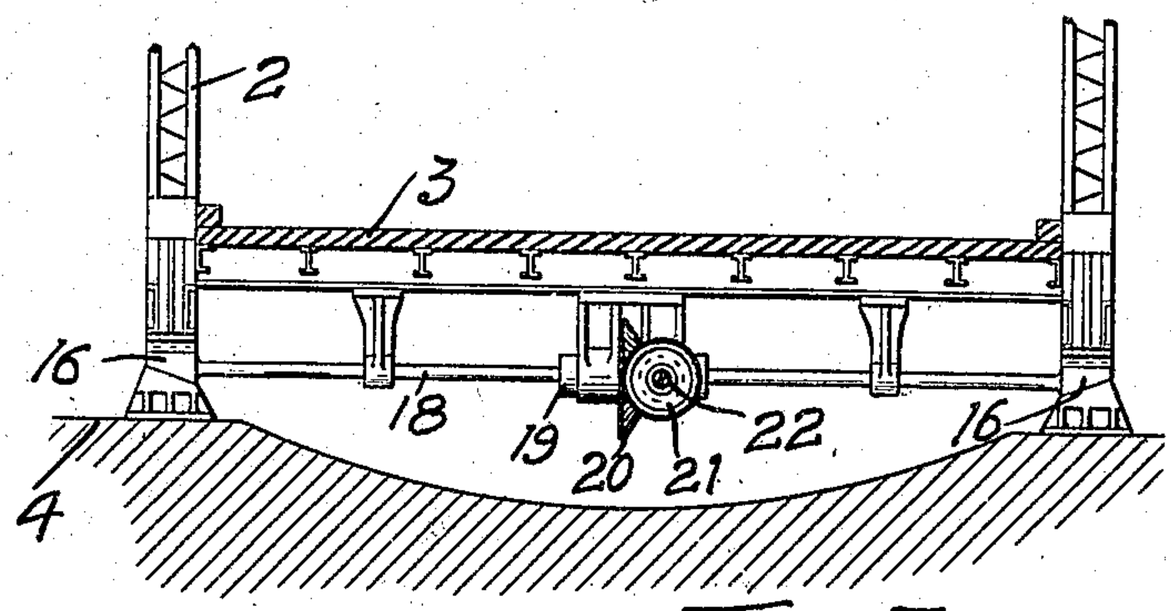

Fig 5.

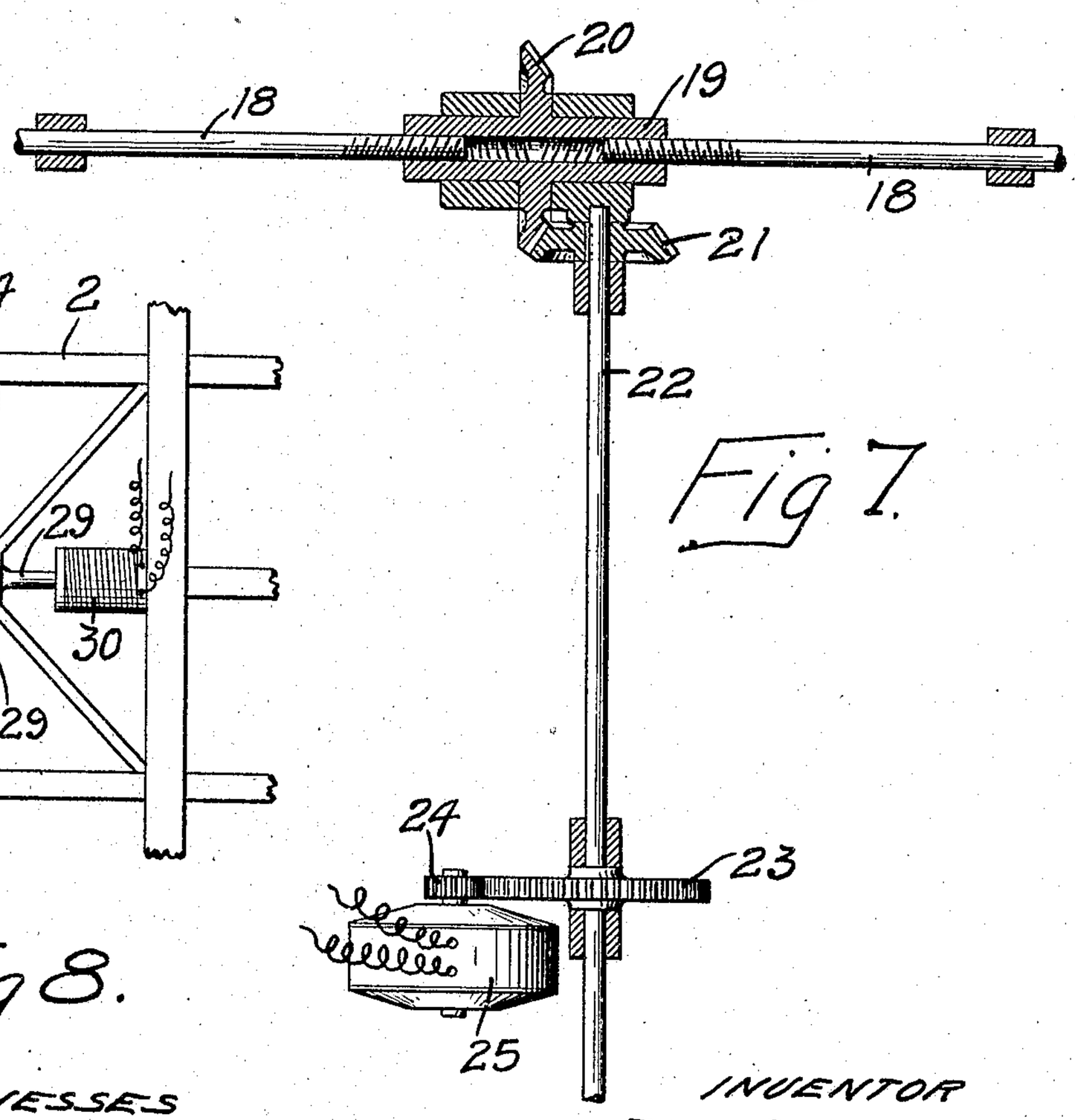

Fig 7.

Fig 8.

WITNESSES

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UNITED STATES PATENT OFFICE.

ERIC SWENSSON, OF MINNEAPOLIS, MINNESOTA.

LIFT-BRIDGE.

No. 911,628. Specification of Letters Patent. Patented Feb. 9, 1909.

Application filed December 9, 1907. Serial No. 405,697.

To all whom it may concern:

Be it known that I, ERIC SWENSSON, of Minneapolis, Hennepin county, Minnesota, have invented certain new and useful Improvements in Lift-Bridges, of which the following is a specification.

The object of my invention is to provide a lift bridge to take the place of an ordinary draw or swing bridge, a lift bridge in its fundamental purpose and uses similar to other lift bridges already constructed and in operation, but of a new type vastly more simple and economical.

Long experience has shown that lack of room and many other difficulties impossible to specify herein, with types of lift bridges so far constructed, lead to complicated, troublesome and expensive designs. This is avoided by using my invention, the "gyratory lift bridge", the designs for this type of bridge in all cases becoming exceedingly simple and economical.

My invention consists generally in a bridge span of any ordinary type and having a suitable roadway, this bridge span being at each end, by means of vertical arms of proper construction, suspended on two trunnions, which rest on and are anchored in two stationary towers, one at each end of the bridge. Thus, by means of suitable machinery I swing the entire bridge span around a horizontal, longitudinal axis so that when the bridge is open, the movable bridge span occupies a raised, inverted position, with sufficient clearance above the water level to allow the largest vessels to pass beneath the inverted span. To reduce the power necessary for moving the bridge, to an absolute minimum, I provide counterweights so that the movable part of the bridge is perfectly balanced around the center line of the trunnions.

Further, the invention consists in various constructions and combinations, all as hereinafter described and particularly pointed out in the claims.

In the accompanying drawings, forming part of this specification, Figure 1 is a side elevation partially in section, of a gyratory lift bridge embodying my invention and showing the movable span in a closed position ready for traffic. Fig. 2 is a similar view illustrating the movable span swung to its inverted position to admit free passage of the largest vessels. Fig. 3 is a vertical sectional view. Fig. 4 is a detail view of a portion of the operating mechanism, viz: the circular rack and the corresponding operating pinion. Fig. 5 is a sectional view illustrating the wedges for transferring the load to the abutment. Fig. 6 is a detail view taken on the line substantially at right angles to the section line of Fig. 5. Fig. 7 is a detail view of the gear mechanism for operating the wedges. Fig. 8 is a detail view illustrating a means for locking the bridge.

My invention consists, generally speaking, in a bridge span having trusses or plate-girders as main carriers and a floor construction for the roadway, suitable for the demands of any particular case, and not differing materially from well-known modes of bridge construction. The span, I will indicate by reference numeral 2, and the roadway by numeral 3.

4 represents the abutments at each end of the bridge.

Instead of resting the span 2 directly upon the abutments as is usual in fixed bridges I provide two suspensory frames 5 of suitable construction, one at each end of the span and I suspend these frames in trunnions 6 which are anchored or supported in upright towers 7. The frames 5 and the fixed towers are portal formed so as to admit the roadway and give necessary clearance for same. The frames 5 may turn on the trunnions secured in the towers or the trunnions may be secured in the frames and journaled in the towers. These towers thus carry through the trunnions, the entire dead load of the span.

Heavy steel castings 8 support the trunnions in the towers and the bearing surfaces of the trunnions in the frames 5, are suitably cushioned. In the upper parts of the frames 5 I provide counter weights 9 of suitable material and arranged to act as counter balances for the entire lower portion of the span. These weights are so adjusted that the entire moving bridge is perfectly balanced around the center line of the trunnions. This balancing of the bridge will be so perfect that only sufficient power to overcome wind pressure and friction will be necessary to open or close the bridge.

To operate the bridge, I provide racks 10 circular in form and arranged to mesh with operating pinions 11 which are connected

through a suitable reduction gearing 12 with motors 13 or other suitable prime movers. I have illustrated the mechanism for operating the bridge at one end only, but it will be understood that a similar apparatus is generally provided at the opposite end. The motor and the gear mechanism is arranged within a suitable inclosure 14 which may form the bridge-operator's dwelling. Suitable friction brakes of ordinary construction which I have not thought necessary to illustrate, are provided in connection with the gearing 12 and the attendant can by means of this gearing and brake mechanism, open and close the bridge easily and quickly.

For a small bridge an operating mechanism at one end only may be provided, while for larger structures a similar apparatus is preferably provided at each end.

For small boats which do not require much clearance, I may raise the bridge only a short distance, while for the larger boats the span may be swung to a completely inverted position. Also, depending on the size of vessels required to pass under a given bridge, I may place the trunnions or towers of suitable height. In this way, the invention can be adapted to any given condition of traffic.

Under the ends of the main carriers I provide wedges or other suitable devices for the purpose of transferring, when the bridge is closed, all live load directly from the bridge span down to the abutment, instead of transmitting it through the frames 5 and the trunnions and then through the upright towers to the abutments.

16 represents the wedges having dovetail recesses 17 therein to fit correspondingly shaped seats on the abutments. These wedges are mounted on rods 18 having right and left hand threads in a hub 19 that is provided with a beveled gear 20. A similar gear 21 meshes with the gear 20 and is secured on a shaft 22. A gear 23 is mounted on said shaft and meshes with a pinion 24 on the shaft of an operating motor 25. By means of this mechanism the wedges are moved back and forth for the purpose of supporting the bridge directly upon the abutments and transmitting the live load thereto instead of allowing the load to be transmitted through the frames 5 to the trunnions and towers. For the purpose of locking the bridge I provide a plate 26 having a socket 27 to receive a bolt 28 on the armature 29 of a solenoid 30. The current being applied to this solenoid its armature will be withdrawn and the bolt disengaged from the socket to release the bridge.

I do not wish to be confined to the structural frame of this bridge or to the mechanism shown for operating it, as both may be modified in various ways to suit different conditions. Various means may also be employed for transmitting the live load to the abutments and preventing the bridge from swinging under wind pressure.

I claim as my invention:—

1. A bridge of the class described comprising a span having a road-way and towers having portals forming continuations of said road-way on which towers the said span is journaled, counter weights for said span and means for swinging said span laterally to an inverted position to open the bridge.

2. A lift bridge comprising a span provided with a roadway and having frames at each end with portals therethrough, and towers having portals, trunnions supporting said frames on said towers, counter balance weights mounted on said frames above said trunnions and means for swinging said span to an inverted position.

3. A bridge of the class described, comprising a span having a roadway, frames at each end of said span provided with portals and towers also having portals, trunnions supporting said frames on said towers, counter balance weights carried by said frames and means for wedging said span to transfer the live load to the abutments and resist wind pressure, substantially as described.

4. A bridge of the class described comprising a span having a road-way, towers having portals leading to said road-way and on which towers the said span is journaled and means for swinging said span on its axis to an inverted position to open the bridge.

5. A bridge of the class described, comprising a movable span with suspensory frames at each end of the same, and fixed towers at each end of the bridge, whereon said span is suspended and journaled, and means for swinging said span around a horizontal, longitudinal axis to an open inverted position, substantially as described.

6. A bridge of the class described, comprising a movable span with suspensory frames at each end of same, and fixed towers at each end of the bridge, whereon said span is suspended and journaled, counter-balance weights to balance said movable span around the center line of the journals or trunnions, and means for swinging said span sidewise around the said center line to an open, inverted position, substantially as described.

7. A lift bridge, comprising a movable span provided with a roadway and with portal formed suspensory frames at each end of said span, and with fixed, portal-formed towers at each end, trunnions supporting said frames on said towers, counter balance weights mounted on said frames above said trunnions, and means for swinging said span around the axis of said trunnions to an open inverted position, substantially as described.

8. A bridge of the class described, com-

prising a movable span having a roadway, and with portal formed suspensory frames at each end of said span, and fixed, portal formed towers at each end of said bridge, trunnions supporting said frames on said towers, counter balance weights carried by said frames, means for swinging said span around the center line of said trunnions to any position, and means for wedging said spans at the ends in order to transfer live load directly from the span to the abutments, and means for locking said span to the abutments or fixed towers, thus preventing the bridge from unduly opening under wind pressure, substantially as described.

In witness whereof, I have hereunto set my hand this 29th day of October 1907.

ERIC SWENSSON. [L. S.]

Witnesses:
ALFR. CARLSSON,
LOUIS SAGERSTACK.